

COMMERCIAL FERTILIZER

CONSOLIDATED
WITH THE
FERTILIZER
GREEN
BOOK

THE SOUTH'S NEW CASH CROP

CORN has always been grown in the South. But, until a few years ago, average yields were low and the crop often represented a loss rather than a profit.

Today, many Southern farmers are producing corn yields as high as any produced in the Midwest. They are making corn pay big profits—either sold as grain or fed to livestock.

What has brought about this change? The answer is that Southern farmers are learning how to grow corn.

They select good corn land . . . prepare a good seed bed . . . plant an adapted hybrid or a proven local variety of seed . . . space close in the row to give 9,000 to 14,000 plants per acre . . . and use shallow cultivation.

At planting, they apply fertilizer adapted to their soil conditions. And, when corn is knee-high, they side-dress each acre with 200 to 500 pounds of **ARCADIAN***, the American Nitrate of Soda.

The importance of heavy applications of nitrogen on corn is demonstrated by the results of 49 experiments conducted over a period of five years by the North Carolina Experiment Station:—

- ▶ where no nitrogen was used, the value of the corn produced was \$42.00 per acre
- ▶ where \$5 worth of nitrogen per acre was used, the value of the crop was \$79.50
- ▶ where \$10 worth of nitrogen per acre was used, the value of the crop was \$106.50
- ▶ where \$15 worth of nitrogen per acre was used, the value of the crop was \$121.50



This is an excerpt from a Barrett advertisement in Southern farm magazines. Barrett advertising helps you promote a balanced fertilizer program, by selling mixed fertilizer for use at planting, and ARCADIAN, the American Nitrate of Soda, for side-dressing.



THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR ST., NEW YORK 6, N. Y.
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ATLANTA 3, GA. • SAN FRANCISCO 3, CALIF.
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THE ELEMENT THAT MAKES PLANTS GROW!

APRIL, 1950



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& BRO.

271 MADISON AVE.
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uses SPENSOL

SPENCER NITROGEN SOLUTIONS

One of the most important ingredients in your mixed fertilizers is the ammoniating solution. We of Spencer are proud of the fact that so many top-ranking fertilizer manufacturers depend on SPENSOL (Spencer Nitrogen Solutions) for their nitrogen.

As you probably know, your use of SPENSOL entitles you without cost to the valuable assistance of the Spencer Technical Department. This team of fertilizer-wise experts will be happy to visit your plant and help you step up production while you improve the quality of your product.

For further information, be sure to write for Spencer's new, fact-filled book, "SPENSOL Properties and Uses."



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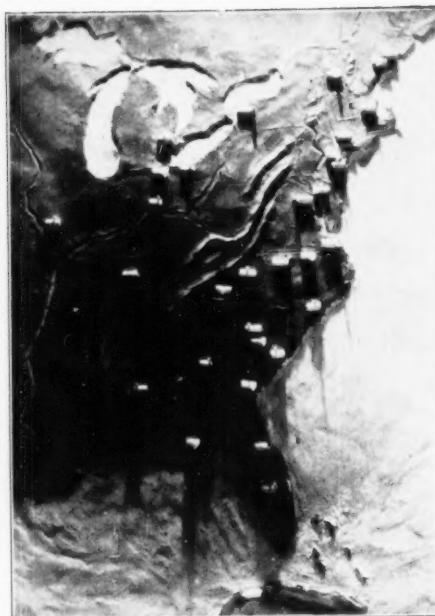


The Dubuque, Iowa plant of Virginia-Carolina Chemical Corporation is only one of 31 V-C plants which produce well-conditioned mixed fertilizers for the farmers of America. Like other V-C plants in the Midwest, the Dubuque operation regularly uses SPENSOL.

A Complete Service

THE strategic factory locations of The American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

We manufacture all grades of Commercial Fertilizers, Superphosphate, Agrinite Tankage, Bone Black, Bone Black Pigments (Cosmic Black), Bone Ash, Bone Oil, Dicalcium Phosphate, Monocalcium Phosphate, Gelatin, Agricultural Insecticides (including Pyrox, Arsenate of Lead, Calcium Arsenate, etc.), Trisodium and Disodium Phosphate, Phosphorus Elemental, Phosphoric Acid, Sulphuric Acid, Ammonium Carbonate, Ammonium Fluosilicate, Magnesium Fluosilicate, Potassium Fluosilicate, Phosphorus Pentasulphide, Phosphorus Sesquisulphide, Ferro-phosphorus, Red Phosphorus, Zinc Fluosilicate, Salt Cake; and we are importers and/or dealers in Nitrate of Soda, Cyanamid, Potash Salts, Sulphate of Ammonia, Raw Bone Meal, Steamed Bone Meal, Sheep and Goat Manure, Fish and Blood. We mine and sell all grades of Florida Pebble Phosphate Rock.



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| Baltimore, Md. | Detroit, Mich. | Pensacola, Fla. |
| Buffalo, N. Y. | Fulton, Ill. | Pierce, Fla. |
| Carteret, N. J. | Greensboro, N. C. | Port Hope, Ont., Can. |
| Cayce, S. C. | Havana, Cuba | Savannah, Ga. |
| Chambley Canton, | Henderson, N. C. | Searsport, Maine |
| Quebec, Can. | Montgomery, Ala. | South Amboy, N. J. |
| Charleston, S. C. | Nat. Stockyards, Ill. | Spartanburg, S. C. |
| Cincinnati, Ohio | Norfolk, Va. | |

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50 Church Street, New York 7, N. Y.

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COMMERCIAL FERTILIZER

ADVERTISING INDEX

| | |
|---|--------------------|
| Abbs Engineering Co. (Kent Mill Division) | 43 |
| Alabama Paper Manufacturing Co. The | |
| Allied Chemical & Dye Corp. The | Front Cover |
| American Agricultural Chemical Co. The | 4 |
| American Industrial Development Co. | |
| American Limestone Co. | 62 |
| American Potash & Chemical Corp. | 13 |
| Arkansas Rice Growers Co-Op. Assn. | 47 |
| Arkell Smiths | 55 |
| Armour Fertilizer Works | 52 |
| Arthoff-Wilson Co. | |
| Atlanta Utility Works | |
| Automatic Scale Co., Inc. | |
| Baggak Division | 59 |
| Baker & Bro. H. J. | Inside Front Cover |
| Barrett Division, The Allied Chemical & | |
| Dye Corp. | Front Cover |
| Baughman Mfg. Co. | 70 |
| Bennis Bag Co. | 7 |
| Bradley Pulverizer Co. | 69 |
| Chase Bag Co. | |
| Chemical Construction Corp. | 12 |
| Cole Manufacturing Co. R. D. | |
| Commercial Solvents Corp. | |
| Cunningham Scale Seal Mfg. | |
| Davison Chemical Corp. | 63 |
| Dickerson Co. The | |
| Exact Weight Scale Co. | |
| Fulton Bag & Cotton Mills | 51 |
| Horle Co. John J. | 23 |
| Marine Bag & Paper Co. | 15 |
| Highway Equipment Co. Inc. | 39 |
| Hough Co. The Frank G. | 14 |
| International Minerals & Chem. Corp. | 34 |
| International Paper Co. (Baggak Division) | 59 |
| Jaite Co. The | 67 |
| Jeffrey Mfg. Co. | 69 |
| Kent Mill Division | 43 |
| Kraft Bag Corp. | 37 |
| Law & Company | 69 |
| Lion Oil Co. | 54 |
| McArthur, H. I. | 69 |
| McIver & Son Alex M. | 68 |
| Mento, Inc. | 5 |
| Monsanto Chemical Co. | |
| National Lime & Stone Co. The | 67 |
| Parker Laboratory | 49 |
| Phillips Chemical Co. | 22 |
| Pittsburgh Coke & Chemical Co. | 58 |
| Potash Co. of America | Inside Back Cover |
| Quaker Oats Co. The | 50 |
| Raymond Bag Co. | 11 |
| Sackett & Sons Co. The A. J. | 26-27 |
| St. Regis Paper Co. | 31 |
| Star-Liman & Co., Inc. | 68 |
| Southern Fertilizer Co. Inc. | |
| Southern Fert. & Chemical Co. | 43 |
| Southern States Phos. & Fert. Co. | 65 |
| Spencer Chemical Co. | 3 |
| Stedman Foundry & Machine Works | 50 |
| Sturtevant Mill Co. | 17 |
| Tennessee Corp. | 43 |
| Texas Gulf Sulphur Company | 21 |
| Thayer Scale & Engineering Corp. | 46 |
| Nicolay Titlestad Corp. | 45 |
| Union Special Machine Co. | |
| United States Potash Co. | 19 |
| United States Steel Corp. of Del. (CIS) | 8-9 |
| Virginia-Carolina Chemical Corp. | 30 |
| Warren Edward A. | 69 |
| Wiles, Inc. | 69 |
| Willingham Little Stone Co. | |
| Woodward & Dickerson, Inc. | 56 |
| Woodward Iron Company | 16 |

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In This Issue

| | |
|--|----|
| Just Around the Corner, by VERNON MOUNT | 10 |
| CFA Committees | 19 |
| It Seems to Me, by BRUCE MORAN | 19 |
| Value of Rare Elements, by A. A. NIKITIN | 20 |
| Markets | 30 |
| Connecticut AES 75th Birthday, by HARRY J. FISHER | 32 |
| Soil Scientists Meet at Connecticut AES | 38 |
| Mississippi Grazing Tour, by GLENN C. RUTLEDGE | 41 |
| Pictures from Arkansas Plant Dedication | 42 |
| Around the Map | 44 |
| Wilson & Toomer, 1893 to Date, by MABEL P. MOYER | 48 |
| Obituaries | 52 |
| In the Field of Farm Chemicals | 53 |
| Fertilizer Industry in the Pacific Northwest, by A. O. BARRETT | 57 |
| Green Pastures for Sale, by F. M. NIER | 60 |
| Kentucky Fertilizer Works, by C. M. TEMPLE | 61 |
| Fertilizer Revolutionized Black Belt, by HAROLD SEVERSON | 64 |
| Classified Advertising | 69 |

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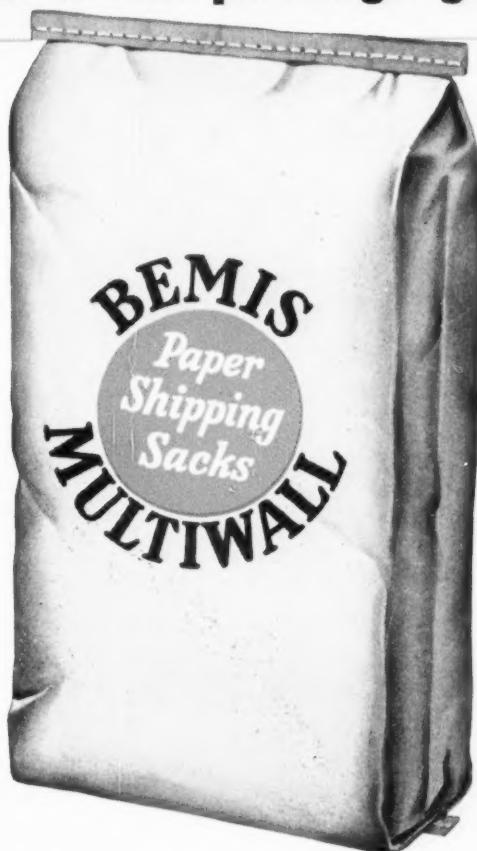
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Bemis uses top quality kraft paper. Each of the three or more plies has been tested for the kind of work it must do. So, there is never any question. It's sure to do the job.

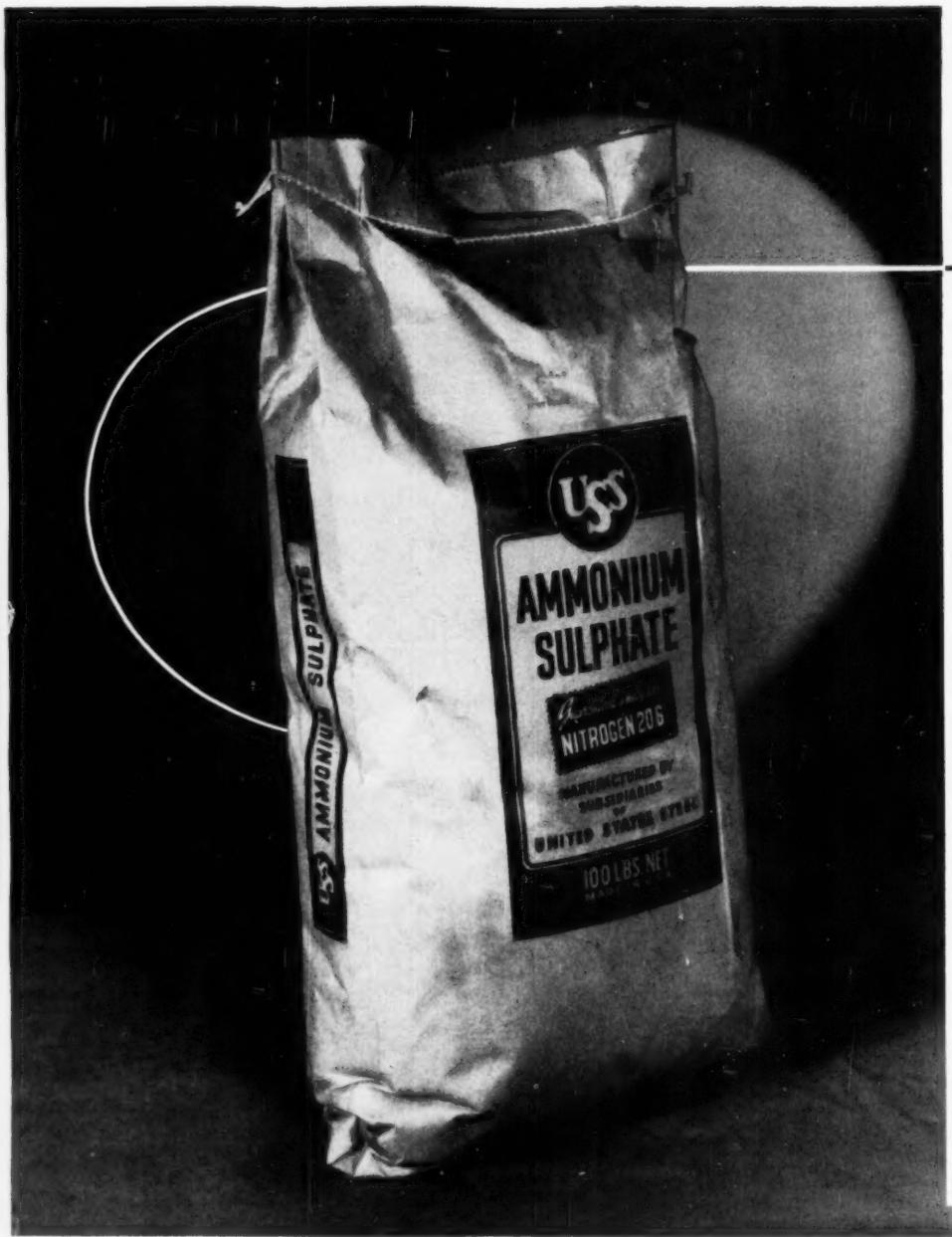
Seven Bemis Multiwall Plants are ready to team up to give you service in an emergency or to provide a dependable source of supply.

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U·S·S Ammonium Sulphate

IN 100-POUND BAGS

● Demand is at its peak *right now* for U·S·S Ammonium Sulphate as a plow-under nitrogen material. Are you getting your share of this business?

It's been proved time and again that U·S·S Ammonium Sulphate is the best nitrogen material farmers can use. Its ammonium nitrogen won't leach from silt or clay loam soils during spring rains, yet is readily available to growing plants.

U·S·S Ammonium Sulphate in 100-pound bags is a profit item for both you and your dealers. Five-ply, asphalt-lined bags keep the material in good condition during shipment and storage.

Order today to take advantage of the spring de-

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AMMONIUM SULPHATE

UNITED STATES STEEL



JUST AROUND THE CORNER

By Vernon Mount



The do-gooders are baffled by the fact that unemployment is resulting from such things as the 75c wage floor. It seems they did not figure marginal workers would be laid off, nor that machinery could be devised to replace workers whose kind, paternal government had priced them out of the market.

Confusion reigns in Washington, and the public is baffled by what goes on there. It is rapidly getting to the point where everybody is calling everybody else either a communist or a liar. Sometimes I wonder whether congressional immunity is a good idea. Free speech is wonderful, but when it permits a man to freely accuse without too much evidence to back up his accusations, I wonder about it. And so do a lot of people in your Capital.

Confusion reigns internationally. I believe even Joe Stalin is confused. Things are not panning out for him the way he planned them, either-- and that is a very bright spot in the firmament.

I sigh for the good old days when you could tell what was going on, because people would lay the facts on the line, without protective coloration, or confusing red herrings. But just now any man who undertakes to make any sense out of what is happening in Washington, and in some other of the world's control centers, is just too optimistic to be sane.

Next month, maybe things will clear up a little . . . but your correspondent is just a weary, baffled--and pretty disgusted citizen. It is a sound country economically. But the surface of it is confusion.

Yours faithfully,

Vernon Mount

Over the Hill to Better Farming Methods and Profits



Over the hill, where farmers are keeping pace with new and better farming methods, you'll find farming a very profitable business . . . and much in evidence will be the use of commercial fertilizers. The fertilizer industry, assisted by the development of a practical, dependable shipping sack, has played an important part in making the average farm a profitable business. CUSTOM BUILT Raymond Multi-Wall Paper Shipping Sacks are recognized as the **QUALITY SACKS** wherever fertilizers are produced, packed, shipped, or used. Give your brands Raymond protection and sales appeal!

THE RAYMOND BAG COMPANY, Middletown, O.





LIGHTNING PRODUCES FERTILIZER, TOO

Nature's fireworks—by transforming the inert nitrogen in the air to nitric acid—produce much more fertilizer per year than do Chemico-built plants. But lightning scatters its benefits without consideration for those who need them. Chemico-built plants, on the other hand, produce the kind of commercial fertilizer you want . . . where you want it . . . when you want it . . . in the

concentration you want . . . at a very reasonable price.

Chemico offers a complete engineering and contracting service to the fertilizer industry, ranging from the design and construction of complete fertilizer works to furnishing small individual units and auxiliary plants of a specialized nature. From Pittsburgh to Pakistan, from Colombia to China, Chemico has been

building such plants since 1914. Chemico brings to each new project a wealth of experience, proven methods and guaranteed performance.

If your plans include the production of nitrates, superphosphates, double superphosphates, ammonium phosphates, mixed salts or any other commercial fertilizers, it will pay you to discuss your specific problems with Chemico.

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*CHEMICO plants are
profitable investments*

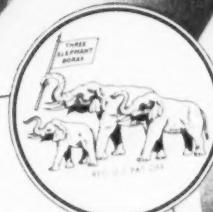


Trona Muriate of Potash

This vitally important ingredient of mixed fertilizer provides the soil nutrient necessary to resist plant diseases and to enhance the productivity of crops. To obtain the best results, specify "Trona" Muriate of Potash . . . made by the pioneer producers in America.

Three Elephant Agricultural Pentahydrate Borax

Contains a minimum of 44% B_2O_3 or approximately 121% equivalent Borax. More economical in this concentrated form when used as an addition to fertilizer or for direct application to the soil, to correct a deficiency of Boron. Consult your local County Agent or State Experimental Station.



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Here is a new Hough PAYLOADER... a new size of PAYLOADER that sets new standards of performance, usefulness and durability for $\frac{1}{2}$ yard tractor shovels. It has the many features that have made Payloaders first choice in industry for handling bulk materials.

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Your Hough Distributor is eager to put this brilliant performer through its paces for you. See him today or write The Frank G. Hough Co., 702 Sunny-side Avenue, Libertyville, Illinois.

Send for catalogs on the new $\frac{1}{2}$ yard HE Payloader or any others — the 12 cu. ft. HA, the $\frac{5}{8}$ yd. HF, the $1\frac{1}{2}$ cu. ft. HL, or the big 4 wheel drive $1\frac{1}{2}$ yd. HM.



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PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.



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dependable

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are best for packaging
FERTILIZERS and CHEMICALS



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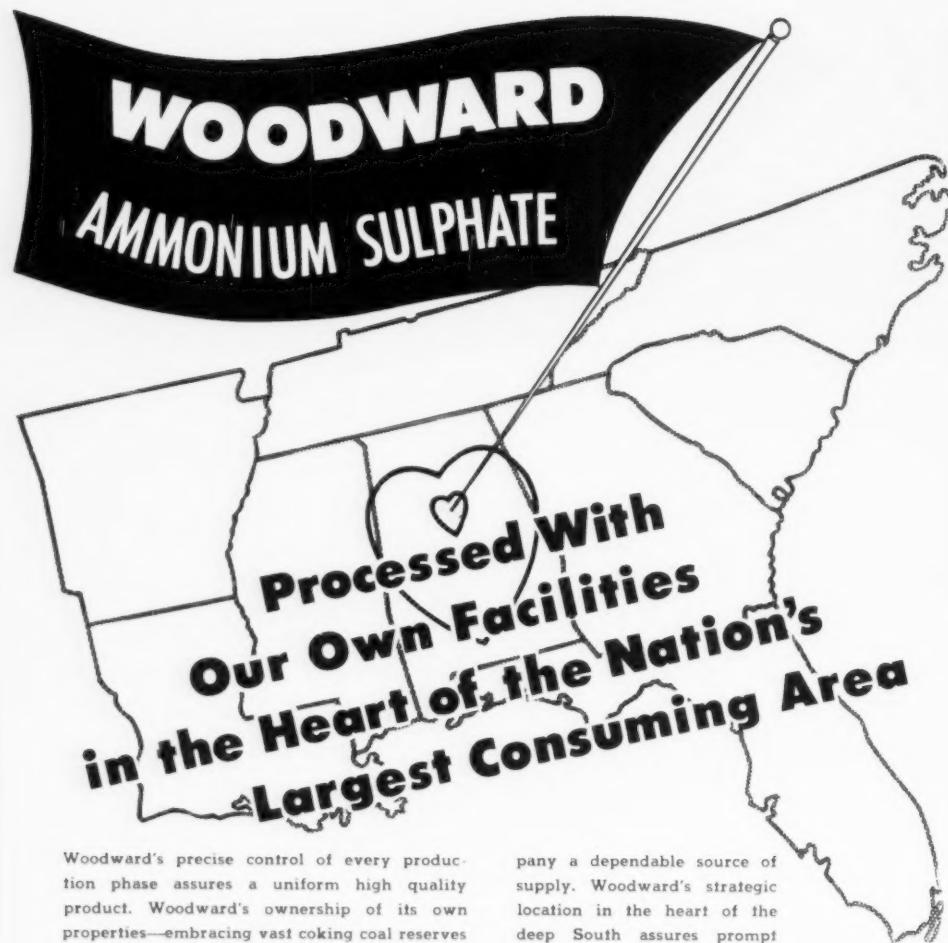
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Woodward's precise control of every production phase assures a uniform high quality product. Woodward's ownership of its own properties—embracing vast coking coal reserves and adequate plant facilities—makes this com-

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● Your Inquiries are Invited.

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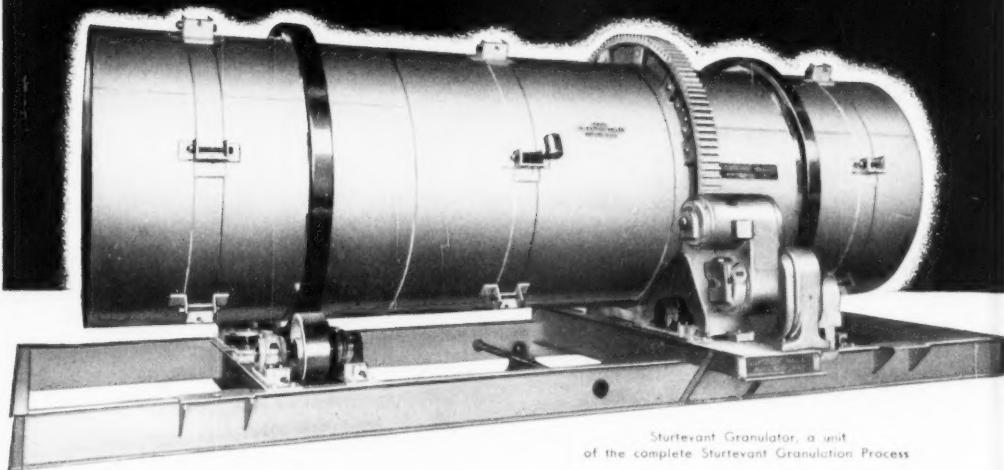
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A New Solution to Fertilizer Preparation . . . with the New Sturtevant Granulation Process



Sturtevant Granulator, a unit
of the complete Sturtevant Granulation Process

- ★ **Granular fertilizer can be stored over longer periods of time**
- ★ **Holds chemical properties without deterioration**

It's here . . . the new Sturtevant Granulation Process for manufacturing granular or pelletized fertilizer. This outstanding method prepares fertilizer granules of uniform size. Its unique design and rugged construction assure long operating life with little if any maintenance.

It will pay you to investigate this new method of fertilizer preparation and Sturtevant Equipment.

Advantages of granular fertilizer include . . . Granular fertilizer can be stored over long periods

without caking, a typical fault of ordinary fertilizer. It means that this type of fertilizer can be bought at any time and used when necessary. Being in hard granular form, it holds its chemical properties without deterioration. In addition, evidence shows that granular fertilizer increases the fertility of the land because plant foods do not wash down below the roots as quickly. It reduces waste . . . saves on labor time of distribution . . . is especially effective for use when airplanes are used for distributing fertilizer.

Clip coupon below for complete information on this new Sturtevant Process of fertilizer preparation.

Mail
this
Coupon
Today

Sturtevant Mill Company

111 Clayton Street, Boston 24, Mass.
Gentlemen:

Please send me further information about the Sturtevant Granulation Process.

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FARM PORTRAIT NO. 4



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In thousands of farm homes, the rich bounty of the summer is still carefully preserved in jars for winter use—although newer and more effective methods are rapidly being adopted.

Another better practice that is rapidly widening in scope is the carefully considered use of the correct fertilizer in the correct amount for each specific need. Many of the best of these fertilizers are compounded with potash—often with Sunshine State Potash, a product of New Mexico, and a vital soil nutrient that provides increased soil fertility and greater resistance to disease and drought.

Reg. U. S. Pat. Off.



HIGRAGE MURIATE OF POTASH

62.63% K₂O

GRANULAR MURIATE OF POTASH

48.57% K₂O

MANURE SALTS 20% MIN. K₂O

UNITED STATES POTASH COMPANY, Incorporated, 30 Rockefeller Plaza, New York 20, N. Y.

CFA Moves Office

California Fertilizer Association is moving into a new office at 4700 District Boulevard, Los Angeles 11.

It Seems to Me

by BRUCE MORAN



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Whenever folks step into a situation with which they are unfamiliar, and try to give advice or press it on the brow of an industry via legislation, they are apt to look a little silly. It seems to me that is the case with our good friends of the Federal Trade Commission, who do so much real good we hate to see them stepping into a scene to which they are obviously strange.

High analysis fertilizers have been the goal of our industry for so many years. Many an optimist has fared forth to show the farmer that he is paying dearly for inert materials... and come home a sadder but wiser man. For the farmer will have none of it.

A glance at the farmer point of view should show why. His whole income for the year is tied up in his fields. He cannot afford to take a risk with them. He and his father and his grandfather before him used low-analysis plant food. So he uses it. And all the preaching of the industry and the agronomist and the county agent fail to change him.

How can F. T. C. wave a wand and accomplish what all these really powerful forces could not?

Grass Roots

Public Relations

Creation of greater understanding between the American farmer and the American public is essential if agriculture is to render its greatest service to the nation and if the farmer in turn is to continue to prosper. Ed Lipscomb, public relations director of the National Cotton Council, said recently.

To achieve such understanding, the Council official, in a new book titled "Grassroots Public Relations for Agriculture," advocated initiation of local public relations programs by farm leaders in each of the country's 3069 counties.

Traditionally, in American history, farmers have been the

most dominant single influence on basic public attitudes, Mr. Lipscomb said. He pointed out, however, that over a period of years farmers have declined numerically from more than 90 per cent of the population to less than 19. During the same period the part of the national income derived from farms has been reduced from over 90 per cent to approximately 15.

Accordingly, he continued, there has been a tendency to minimize the importance of the farmer and agriculture despite the fact that from a standpoint of the national welfare farmers are one of the few completely indispensable groups in America.

The purpose of this paper is to make more readily available the information secured by various investigators at State and Federal Agricultural Experiment Stations, in their investigations on plant nutrition.

The elements manganese, iron, zinc, and copper have sometimes been called the minor elements because they are required by plants only in trace amounts. This does not mean that they are not as vital to the well-being of plants as the other elements such as potassium, nitrogen, phosphorus, magnesium and calcium, for they are vital to plant growth and health.

The minor elements may be compared to vitamins in that they do not serve as a complete "food" for plants without the major elements.

These minor elements may occur in sufficient quantities in most soils; however, if any one element is deficient in the soil, an abundance of other elements will not make up for its lack. When we refer to deficiencies of these elements it is not generally a question of absolute deficiency in total quantity of the element in the soil, but rather a deficiency arising from insufficient availability.

The physical and chemical properties of soils have a great deal to do with availability to plants of various elements.

The first factors in the soil affecting availability of the elements are as follows:

- 1) Character of the soil reaction, i.e. the pH value of soil.
- 2) Amount of colloidal material present in the soil.
- 3) Organic materials consisting of plant and animal residues,

The Value of the

By A. A. NIKITIN, Tennessee Corporation

known as humus.

Soil acidity is not derived from such commonly known inorganic acids as sulfate, phosphate and borate, but rather from a process of prolonged movement of rainwater through the soil. This comes about because the main soil acids are themselves the colloidal particles of clay. These clay acids have a tendency to lose the base elements, calcium, magnesium, potassium and sodium, that were absorbed to their surfaces. Excessive cultivation and lack of cover crops during the rainy season may increase this leaching out. If these alkaline materials wash out to too great an extent, the soil will be acid; but if the soil particles are saturated with the basic elements from liming, the soil again becomes alkaline. This replacement of one cation absorbed by a colloidal particle (A. g. soil), by another is called base-exchange capacity.

Clay soils have a higher base-exchange capacity than sandy soils, and will retain higher concentrations of the essential elements. In soils of high humus content, these essential elements will, to a large extent, be retained in a form of salts which are readily available to the plant.

Marl soils or heavily limed soils, which are of alkaline reaction, tend to render the essential elements practically unavailable to plant growth.

Dr. K. C. Beeson of the U. S. Department of Agriculture's Plant, Soil, and Nutrition Laboratory, Ithaca, New York, has said, "It should be remembered that these deficiencies are more frequently associated with liming practices than any other factor".

We shall discuss chiefly the elements manganese, zinc, copper, and iron, their relationship to plant growth, and now their deficiency may be noted on some major crops.

Manganese has the name of the "green element" because it functions chiefly in the synthesis of chlorophyl, the green coloring matter of plants. A lack of manganese is most likely to be associated with calcareous or heavily limed soils. Oxidizing conditions, influenced by mineral salts as well as by the soil organisms, seriously affect the availability of manganese.

The addition of sulfur to soil helps to release manganese. Analyses have shown that although the increase in exchangeable manganese due to application of sulphur may not be marked, the increase in manganese content of plants is sufficient for improving the plant growth. The addition of organic matter to the soil has the same result.

This element, along with copper and zinc, directs the major elements, nitrogen, phosphorus and potash, to their positions for

Rare Elements

carrying out their particular functions in the plant.

Several physiological diseases, the best known of which are "Grey Speck" of oats and "Marsh Spot" of peas, have been definitely proved to be due to a manganese deficiency.

The value of zinc as a plant nutrient and also its toxic effects are not new discoveries, though the extensive use of zinc salts for nutrient purposes on crops in the field dates from only a few years back.

Zinc has become established as both a plant nutrient and a valuable fertilizer and spray

material.

The role of zinc within the plant is not yet understood, but it may be postulated that zinc is necessary for chlorophyll formation and growth.

Zinc deficiency occurs on heavy clays and clay loams, light sands in which the colloidal material is organic in nature, muck soils, soils containing high calcium carbonate, and clay soils of low exchange-capacity, (i.e. the clays in which the base ions are not readily exchangeable.)

The availability of zinc in the soil varies and depends greatly upon the pH, being lower as the

pH rises, the critical range being between pH 5.5 and 6.5.

The deficiency of zinc on many acid soils appears to be due to the cropping out of naturally available zinc or that accumulated by native plants.

In some acid soils zinc availability may be reduced through the retention of the zinc by organic compounds in the soil.

It has been found that trees pick up considerably more zinc and copper when magnesium deficiency is eliminated.

Plants apparently vary greatly in their zinc requirements, and also in their ability to obtain zinc from a given soil.

Zinc, the "vitalizing element" has been found to be effective in treating some physiological diseases, such as "mottle leaf" or "Frenching" citrus, "little leaf" of peaches, "bronzing" of Tung trees, and pecan "rosette."

COPPER

The function of copper as a fungicide for the protection of plants against fungus diseases has been known for over 60 years; however it has only recently been proved that copper also has a nutritional value in plant growth.

Copper is a normal constituent of a large number of plants. The fact that seeds are high in copper suggests that this element is especially important in the case of plants grown for seed.

Available evidence indicates that copper deficiency in vegetables is most commonly observed in those grown on dark colored soils, which contain a high percentage of organic matter. Most mineral soils except pos-

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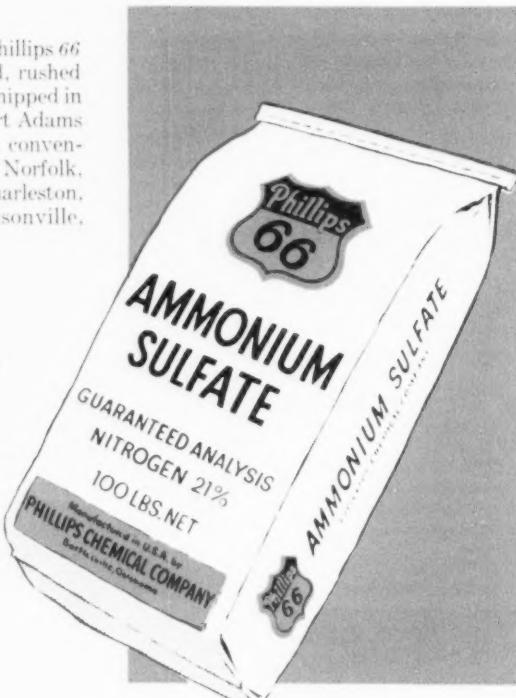
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Fertilizer dealers may be able to take a tip from soil scientists at Michigan State College, East Lansing, Mich., and demonstrate to farmers, through soil profiles that there is more than just plain dirt beneath the surface of the land.

Late in January, when more than 30,000 agricultural people converged on the college for the Michigan Week, members of the school's research staff employed the "profile boards" aid in explaining types and differences in soil structure. And, while not as famous as the Great Profile, the soil profiles proved interesting to the men who see the earth only as deep as a plow point.

A soil profile is a slice of earth from the surface down to the parent material. Profile boards used by the college were four feet long and eight inches wide. Prof. J. Q. Lynd, a young Michigan State College soils scientist, has sixteen profiles in his growing soils "library," and hopes to boost his collection to at least 50.

Lynd's methods are ingenious and practical. Since developing a profile requires pick-and-shovel work, Lynd takes his spade from a road cut, when feasible. In any case, he digs to a depth of four feet. He then sprays a solution of dissolved plastic on the exposed surface, and next applies a layer of heavy cheesecloth over the plastic-coated area. The plywood board is then fitted snugly against the plastic-coated area. While the binding secures Lynd's needs to keep away dirt on the earth side of the board, making chain ties every few inches to keep the soil strata from disintegrating. When the whole profile is bound to the board, it is stripped away from the earth bank. Final touches are added in the laboratory. Lynd makes certain his profile is authentic, that nothing has jiggled out of place, then cleans off the surface of the profile, and applies an overall coat of plastic. This results in a permanent, transparent "binding," and the display is ready for use as a visual aid.

sibly some that are very sandy and leachable, or those which contain an excess of lime, contain a sufficient amount of copper to support normal crops of vegetables.

Copper, like zinc and manganese, seems to act as a catalyst for some of the major elements. It is necessary for vigor and fruit production in plants.

The existence of a copper-nitrogen balance has been noted on several crops and this effect on nitrogen metabolism has an

important bearing on nitrogen fertilization in copper-deficient areas. Copper has been observed to protect against toxic effects of certain proteins formed as a result of excessive nitrogen fertilization.

The results of H. C. Harris of the Florida Agricultural Experiment Station showed that, among grain crops, oats appear to be particularly sensitive to copper deficiency. Even a very small amount of soluble copper salt applied to the soil has a

beneficial effect on plant growth and yield.

Dr. Harris also found that the basic fertilizer treatment, especially in conjunction with copper, appeared to have an effect on cold resistance of oats.

IRON

A deficiency of available iron results in a chlorosis of plant foliage. Like those of zinc manganese and copper, iron deficiency usually associates itself with highly calcareous or overlimed soils. Another basis for iron deficiency has been suggested—that, under alkaline conditions, iron already in the plant is thrown out of solution, principally in or near the nodes (joints), so that it fails to reach the leaves where it is needed.

Treatments

In correcting deficiencies of the rarer elements, consideration must be given to the reasons for the deficiency, and a suitable method of treatment chosen. The composition of the soil, its reaction, and the relationship between minor and major elements, must be seriously considered.

Overlimed or calcareous soils are likely to "tie up" the minor elements in insoluble alkaline salts, making them unavailable to plants, even though there may be a sufficient quantity of the actual elements present in the soil. In such cases, small amounts of the required minor elements should be added at intervals during the growing season so that a supply of these elements will be readily available to the plants.

On clay soils the required amount of fertilizer materials

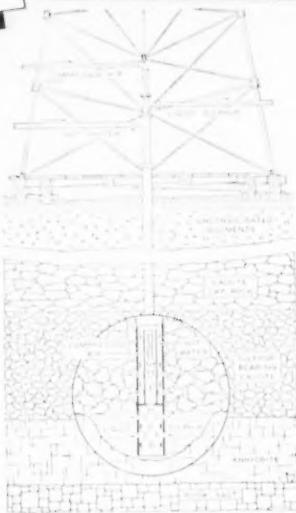
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*WELL PIPING

The well equipment consists of pipes of various sizes, placed one within the other and extending from the surface into the sulphur deposit. A 10" or an 8" casing extends to and rests on the top of the cap rock. A 6" pipe, inside the casing, passes below it and reaches into the barren anhydrite. It is perforated at two different levels, separated by an annular collar. The upper set of perforations permits the hot water to enter the sulphur formation and the lower set permits the entrance of the molten sulphur to the discharge pipe fitted inside the 6" pipe.

When a well is "steamed" the hot water passes down the annular space inside the 6" pipe and outside the sulphur pipe and flows through the upper set of perforations into the porous formation. The entire mass through which the hot water circulates is raised to a temperature above the melting point of sulphur. The liquid sulphur being heavier than water, makes its way downward to form a pool and displaces water around the foot of the well, and rises in the well column through the lower perforations into a 3" pipe which is the sulphur discharge pipe. Compressed air released at the bottom of still another pipe fitted inside the 3" pipe rises and mixes with the sulphur column, forming an air lift which raises the liquid sulphur free of water to the surface.



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may be added before planting of the crops.

Soil amendments may be used to improve the physical or chemical character of the soil and to aid in the correction of deficiencies. Lime is used to neutralize excessive acidity and to loosen clay soils. A certain amount of lime also helps to reduce the leaching of mineral salts. Overlimed or alkaline soils may be neutralized by treatment with sulphur or acid-forming fertilizers such as sulphates, which tend to render the mineral salts more available for plant growth.

The methods of applying the essential elements in the correction of soil deficiencies may be divided into two classes:

1. Treatment of the soil
2. Treatment of the plant.

The soil treatment may be made by surface application of fertilizer broadcast or as a side dressing. For much application the soluble salts of the essential elements may be applied alone or in combination with other commercial fertilizers. Use of fertilizers containing potassium and sodium in large amounts must be carefully considered, since these salts may seriously affect the solubility of the rarer elements.

Plant treatment may be made by either spraying or dusting plants with neutralized mixtures of the elements. Latest progress has made available the elements copper, zinc and manganese in neutral form, suitable for direct application to plants without treatment with lime.

Plant treatment has considerable advantages over soil treatment, since its action is much

more rapid, due to the large leaf area which is in contact with the fertilizer material. It has been proved that plants readily absorb the mineral elements thus applied, in quantities sufficient for their growth.

The rates of application of the different elements will depend upon the type of soil, method of application, and the extent of the deficiency, as well as upon the crop on which they are used.

The average chemical composition of a large number of plants shown the following amounts of the rarer essential elements to be present:

Manganese 101 parts per million

Iron 251 parts per million

Zinc 41 parts per million

Copper 11 parts per million

From the above it is evident that large amounts of the elements may be detrimental, just as deficient amounts are.

In plant treatments, combination sprays seem to perform better than single sprays, and even though plants may not show visible signs of needing all elements, soils benefit in the long run. One element, though not noticeably needed, may make another available, or it may serve as an antidote against toxicity from some element present to excess.

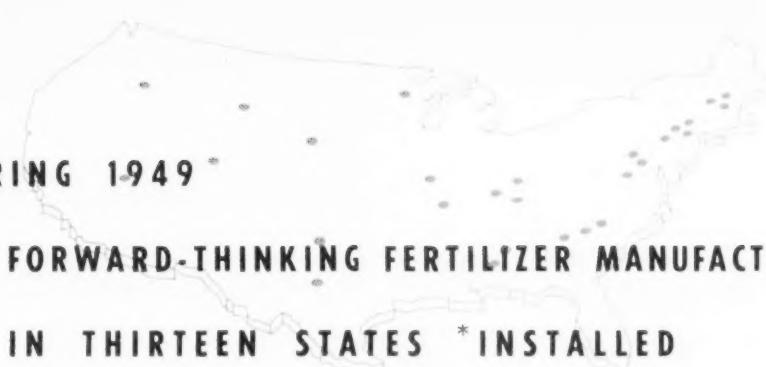
A typical formula for spraying fruit and ornamental trees should contain, per 100 gallons of spray:

10 per cent manganese

10 per cent copper

5 per cent zinc

Note: If acid salts are used, equal amounts of lime must be used to prevent injury.



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The Symposium, "Hunger Signs in Crops" was used as the chief reference on this subject.

Manganese

Manganese deficiencies in various crops manifest themselves in the following ways:

Potatoes:

1. Chlorosis of leaves, first appearing between veins as pale green, yellow, or red.
2. Numerous dead brown patches
3. In the final stage, leaves are practically devoid of chlorophyll. (It was for that reason that manganese was given the name of the "green element.")

Tomatoes:

1. Lightening of green color in foliage—veins remain green.
2. Necrotic spots appear on leaves.
3. Growth is spindling.
4. Little or no blossoming, and no fruit set in severe cases.

Truck Crops:

A) Spinach

1. Chlorosis at growing tips first, then throughout entire plant.
2. Plant turns pale green to golden yellow, while principal veins stay green.
3. Dead white areas may appear between veins.

B) Beets

1. Gradual deepening of red color to purple on tops.
2. Little growth of roots or tops.
3. Dead areas eventually appear between the veins of the tops.

C) Snapbeans

1. Gradual loss of green color in the tri-foliate leaves.

Symptoms of Rare

By A. A. NIKITTIN, Tennessee Corporation

2. Growth is retarded.
3. Chlorotic leaves do not attain normal size.

4. Leaves finally turn golden yellow.

D) Cucumbers, Squash, and Peppers

1. Web of leaves turns yellowish, while veins remain green.
2. Stems are small, weak, and slender.
3. Blossom bud turns yellow.
4. Growth and yields are reduced.

E) Cabbage and Crucifers

1. Chlorosis of the leaves, causing a paler green color, while veins remain darker green.
2. Growth is retarded.

Tobacco

1. Young leaves are chlorotic with spots of dead tissue scattered over leaf.
2. Terminal bud does not wilt or die.
3. Entire vein system remains green, with tissue between turning pale.

Barley

1. Yellowing of entire leaf, not uniformly, but in strips and spots.
2. Leaves hang limply.

Onions

1. Tops pale in color.
2. Tops are lacking in firmness.
3. Onions may be reduced in

size and yield.

Citrus

1. Leaves are mottled, but not as distinctly as with zinc.
2. In severe cases, leaf assumes a dull yellowish-green color.
3. Brown specks appear on leaves.
4. Fruit yield is reduced.
5. Trees lose some foliage giving an open appearance to branches.

Zinc

Various crops show very definite symptoms of zinc deficiency, which are as follows:

Potatoes

1. Plant growth is retarded.
2. Top leaves assume a slightly vertical position, margins of leaves curling slightly upward.
3. Leaves are smaller, with grayish-brown to bronze-colored spots.
4. Plants are significantly shorter than normal, with smaller weight of foliage and tubers.

Tomatoes

1. Abnormally small leaves, yellowish or mottled in color.
2. Evidence of leaf injury.

Truck Crops

A) Squash

1. Extremely mottled leaves.
2. Necrotic or dead areas ap-

Element Deficiencies

pearing on leaves in severe cases.

B) Beans

1. Abnormally small yellowish leaves.
2. Dead areas in leaves in severe cases.

C) Mustard

1. Small leaves, which becomes mottled and yellow.

Apples and Nuts

"Rosette" disease, characterized by:

1. Whorls of small, stiff, sometimes mottled leaves near tips of twigs.
2. Severe reduction in fruit-bud formation.
3. Fruits formed are usually small and malformed.

Peach

"Little Leaf" disease, characterized by:

1. Rosettes of small leaves on the terminals.
2. Chlorotic mottling of foliage in late summer.
3. Premature foliage drop.
4. Twig dieback.
5. Very little fruit produced.
6. Fruit on affected branches misshapen.

Corn

"White Bud" disease, characterized by:

1. Light yellow streaks on leaves, between veins.
2. Small, white, dead spots appearing

3. Unfolding buds have unhealthy white or pale yellow leaves.
4. Growth is stunted.
5. Oldest leaves die.

Cotton

1. Chlorosis of leaves which may progress to the extent that the leaves are practically devoid of color.

Citrus

"Frenching" zinc deficiency is probably more widespread in citrus than any other, and is characterized by:

1. Green bands along midrib and veins, with remaining tissue light green, greenish yellow, or pale yellow.
2. Narrow leaves on twigs with short internodes.
3. Leaves may be very small, with tendency to stand erect.
4. Outside leaves may die back, and water sprouts appear on main branches and trunk.
5. In severe cases fruit produced is very small, having no commercial value.

Copper

Copper deficiencies have similar general symptoms on most vegetables. The following are some specific symptoms:

Potato

1. Loss of turgor and permanent wilting in young leaves.

2. Terminal buds tend to droop when flower buds are developing.
3. Drying of leaflet tips.
4. No pronounced chlorosis.

Tomato

1. Abnormal bluish-green foliage.
2. Curled leaves.
3. Stunted growth of shoots.
4. Poor root development.
5. Absence of flowers.
6. Final development of chlorosis and lack of firmness in leaves and stems.

Truck Crops

A) Onions

1. Lack of firmness.
2. Thin, pale yellow scale.
3. Slow growth.

B) Lettuce and Beans

1. Pale foliage.
2. Weak plants.
3. Loss of firmness in stems and leaves.
4. Slow-up of growth.

Iron

Iron deficiencies in various crops exhibit the following distinguishing symptoms:

Potatoes

1. Slight chlorosis in young leaves.
2. Tips and margins retain green color longest.
3. Principal veins retain normal color.
4. Foliage becomes white in severe cases.

Tomatoes and Other Truck Crops

1. Development of yellow leaves on upper parts of the plant.
2. Chlorosis of the young leaves, with little dying of tissues.

MARKETS

Tag Sales Soar in February

Totaling 1,447,000 equivalent short tons, fertilizer tax tag sales during February, as compiled by The National Fertilizer Association, were second only to the record high for February chalked up in 1949.

The February total, as shown in the table below, was about 1½ percent below that of February 1949.

ORGANICS: Organics for fertilizer use are in extremely tight position with producers of domestic Nitrogenous sold up for several months. The price on domestic Nitrogenous is nominally around \$4.00 per unit of Ammonia in bulk to b.o.b. production point. Dried Ground Blood and Tankage are at prices too high to interest most fertilizer manufacturers. Imported Nitrogenous when offered is for shipment too late to be of use this season.

CASTOR POMACE: The domestic production continues in a sold up position and movement is confined to shipments against existing contracts. The price is nominally \$30.50 per ton in bags to b.o.b. Northeastern production points.

DRIED GROUND BLOOD: The Chicago market is around \$1.50 to \$1.75 per

| S T A T E | February | | Cndlr Year Cumulative January February | | Fiscal Year Cumulative July February | |
|---------------|-----------|-----------|---|-----------|---|-----------|
| | 1950 | 1949 | 1950 | 1949 | 1949 | 1948-49 |
| Virginia | 97,714 | 107,683 | 180,974 | 198,450 | 369,400 | 389,355 |
| N. Carolina | 285,083 | 316,618 | 371,153 | 623,946 | 561,905 | 1,087,884 |
| S. Carolina | 198,660 | 197,580 | 356,610 | 371,034 | 556,754 | 606,274 |
| Georgia | 208,697 | 234,801 | 358,026 | 366,496 | 575,239 | 626,459 |
| Florida | 163,028 | 124,780 | 301,751 | 240,573 | 770,380 | 588,747 |
| Alabama | 110,281 | 159,991 | 152,100 | 248,076 | 317,817 | 434,440 |
| Tennessee | 26,255 | 35,666 | 42,799 | 66,895 | 145,922 | 202,707 |
| Arkansas | 24,649 | 37,834 | 41,564 | 66,610 | 108,982 | 155,018 |
| Louisiana | 36,958 | 33,317 | 56,589 | 60,955 | 113,033 | 130,376 |
| Texas | 67,888 | 41,175 | 108,242 | 91,143 | 323,891 | 300,449 |
| TOTAL SOUTH | 1,219,733 | 1,290,445 | 1,969,888 | 2,330,178 | 3,841,125 | 4,524,170 |
| Indiana | 73,822 | 37,161 | 172,197 | 133,693 | 577,616 | 640,768 |
| Kentucky | 96,981 | 92,380 | 154,376 | 180,735 | 320,423 | 392,064 |
| Missouri | 56,362 | 48,425 | 133,866 | 116,306 | 301,850 | 302,062 |
| TOTAL MIDWEST | 227,145 | 177,966 | 460,439 | 430,734 | 1,199,889 | 1,334,894 |
| GRAND TOTAL | 1,446,878 | 1,468,411 | 2,430,327 | 2,760,912 | 5,041,014 | 5,859,064 |

unit of Ammonia in bulk with the New York market approximately \$8.00 per unit.

POTASH: Production is described as practically normal but supplies are still short for most fertilizer manufacturers. Prices remain unchanged.

GROUND COTTON BUR ASH: Interest continues steady and sales have been made recently at 65¢ per unit of K.O. Potash in bulk to b.o.b. Texas shipping point for material testing 30% to 40% K.O. and 3% to 4% Chlorine.

SUPERPHOSPHATE: Demand recently has improved considerably but stocks continue adequate. Prices are steady.

PHOSPHATE ROCK: Movement to acidulators is described as steady and stocks are adequate. Prices continue unchanged.

SULPHATE OF AMMONIA: With the export of considerable quantities of synthetic material abroad, the supply situation is tightening as domestic demand increases. The prices are firm.

NITRATE OF SODA: Demand continues seasonal with stocks adequate and prices unchanged.

AMMONIUM NITRATE: Canadian production is reported short of demand and domestic production continues to move against a steady demand.

GENERAL: Organic Ammoniates and Potash continue in tight supply. Superphosphate is moving in improved volume from stocks which are apparently adequate.



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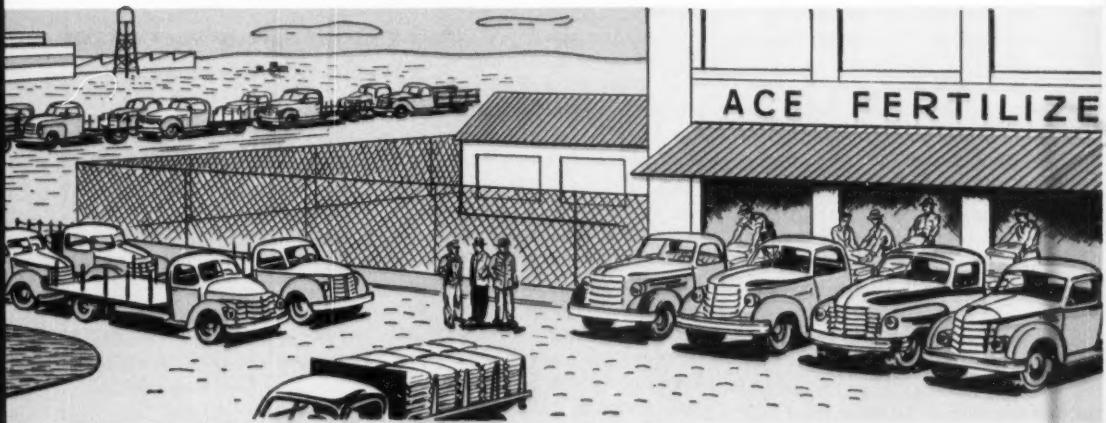
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This year not only are we celebrating the 75th anniversary of the founding of this Station, but the fertilizer industry is also celebrating the 100th anniversary of the manufacture of commercial fertilizers. It is therefore doubly appropriate that this paper should be presented at the present time, because Connecticut had much to do with establishing the present pattern of fertilizer inspection and fertilizer inspection was largely responsible for the Connecticut Agricultural Experiment Station being founded when it was.

Connecticut did not have the first fertilizer law. So far as I know the first fertilizer law of any sort was a "public local law" passed by the Maryland legislature in 1832 providing for the inspection of plaster of Paris by the city of Baltimore.¹ The first Connecticut fertilizer law was not passed until 1869, but fertilizers were being analyzed in Connecticut, and the results of these analyses were being published, 16 years before that.

Fertilizer inspection is not merely printed matter appearing in a book—even a statute book—but the actions of men, and its history cannot be discussed without saying something of who these men were and what they thought and did. The history of fertilizer inspection in Connecticut begins with one man—Samuel W. Johnson. Samuel Johnson was born in Kingsboro, New York, in 1830. At an early age, largely as a result of exposure to a copy of Fresenius's "Chemical Analysis", he became interested in chemis-

75 Years of Real CONNECTICUT A. E. S.

BY HARRY J. FISHER

try and particularly in the influence of chemistry on agriculture. When he was 18 he had a private laboratory, and at 19 he published an article on the analysis of limestone. Time will not permit me to go into details of his early life, very briefly, he entered the Yale "School of Applied Chemistry" under J. P. Norton in 1850, went to Europe in 1853, where he studied for two years under Erdmann at Leipzig and under Liebig at Munich; and in 1855 returned to America as a "first assistant" in the Yale Scientific School. His early interest in agriculture had never weakened; even while in Europe he wrote articles for home agricultural papers. One of these, appearing in the "Country Gentleman" of March 1853, was a discussion of the manufacture of superphosphate of lime and a report of analyses of samples of this material, including two samples originating in New Canaan and New Haven, Conn. No sooner had he returned to America and New Haven than he began contributing to the "Connecticut Homestead." One of his papers on the exposure of frauds in fertilizers appearing in that journal in 1856 led to his appointment as chemist to the Connecticut State Agricultural Society in 1857, and his first report to that society

was published January 12, 1858.

At the annual meeting of the Agricultural Society on January 7, 1857, Prof. Johnson read an address on "Frauds in Commercial Manures," in which, after recounting the results of his analysis of commercial fertilizers that had been published in the "Connecticut Homestead" in 1856, he presented a plan for fertilizer inspection which is worth reproducing because it so clearly shows how his ideas were to present practices:

"Let a trustworthy chemist be employed to analyze every year all the various manures that come into the Connecticut market. Let the analysis be made, not on samples forwarded by the dealers, or manufactured for analysis, but on specimens procured by the farmers themselves, such as shall fairly represent the article that is spread upon the fields. These samples should be procured from different places, and the same manure should be repeatedly examined in order to test the uniformity and reliability of its composition. The analysis should be repeated every year, so that all improvements or deteriorations in the manufacture be kept pace with. The results should be published in the organ of the Society, so that all its

Letter of F. P. Vetch to E. M. Bailey
Sept. 4, 1930.

Service to Agriculture

CELEBRATES ANNIVERSARY

members be informed what are good fertilizers, and what are trash. With this system in skillful operation, an honest dealer would sell his commodities nowhere more gladly than in Connecticut, for he would be sure of finding for them here a full and enlightened appreciation, while the rogues would send their wares to some other market; the risks of detection would be too great for them to encounter."

In 1856 Johnson followed the lead of Stoeckhardt in Germany in assinging monetary valuations to the ingredients of fertilizers and so calculating the market values of good fertilizers, good and bad, whose analysis he reported.

In 1866 the State Board of Agriculture was founded, and Johnson began to report to this board. All this time Connecticut had no fertilizer law; the analysis that were being made were done by Johnson or under Johnson's supervision at Yale, on samples submitted by farmers or the Agricultural Society, and were published in farm papers. On July 8, 1869, the Connecticut legislature for the first time

passed "An Act to prevent Fraud in the Manufacture and Sale of Fertilizers." This law is not too long to read in full:

"Sec. 1. Commercial manures sold, or kept for sale, in this state, shall have affixed to every bag, barrel, or parcel thereof, which may contain fifty pounds or upwards, an especial name or trademark, by which the same may be known or designated, with the name and place of business of the manufacturers or seller, together with a true analysis or specification of the chemical elements and their several amounts contained therein, and also the quantity contained therein, and also the quantity contained in the package.

"Sec. 2. Any manufacturer or trader who shall sell or offer for sale, any such package, and who shall neglect to affix such stamp, impress, or card, as is provided in section first of this act, or who shall affix a stamp, impress, or card, claiming five per cent. more of any fertilizing ingredient than is contained in the package, shall forfeit ten dollars for each and every one hundred

dred pounds of the material so sold, or offered for sale, without the proper marks as directed in section first, to be recovered before any tribunal of competent jurisdiction, one-half to the state and one-half to the prosecutor for the same.

"Sec. 3. The provisions of this act shall not apply to fish pomace, nor to any manure prepared essentially from fish, and sold as such, nor to any other commercial manure which is sold at a price not exceeding one cent per pound.

"Sec. 4. The secretary of the Connecticut board of agriculture is hereby authorized, at his discretion, to procure the analysis of any fertilizer offered for sale in this state, and to prosecute any persons who violate the provisions of this act."

You see the chief requirement of this law was that every commercial fertilizer be tagged with "A true analysis or specification of the chemical elements and their several amounts contained therein;" there was a ten dollar penalty for each hundred pounds of deficient fertilizer sold and authority to procure analysis and prosecute offenders was given to the secretary of the Board of Agriculture.

In the next five years Johnson was working for the establishment of experiment stations in this country. There is not time here to discuss all the various developments in detail. It must suffice to say that in 1873 a committee of the Board of Agriculture reported in favor of the establishment of a State

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experiment station and the following year appeared before the agriculture committee of the Legislature in support of this proposal, only to be turned down. Then what may be considered to be an "end run" resulted in Connecticut's getting the first agricultural experiment station in the United States. Johnson and the committee of the Board of Agriculture had proposed an experiment station to be wholly administered by the State and supported by State funds that would be a scientific research institution for the benefit of Connecticut agriculture. The defeat of the committee's bill was probably due to the reluctance of the farmers in the Legislature to spend the money. Apparently independently of this committee, Mr. Orange Judd, who had recently endowed Wesleyan University in Middletown with a considerable sum of money, offered the free use of the laboratories of this University to the State to establish an agricultural experiment station if the State would appropriate \$700.00 a quarter for two years to employ men to carry on the work. Mr. Judd stated "that the purpose of this station was for the analysis of commercial fertilizers alone." The offer was accepted by the State, and it can therefore be said with perfect truth that fertilizer inspection was the cause of Connecticut's being the first State to have an agricultural experiment station.

The two years the Station was at Middletown it was under the direction of W. O. Atwater, later to become famous for his tables of the composition of food

It concerned itself chiefly with the analysis of fertilizer. Before the two years were up the Legislature passed an act establishing the Station on a permanent foundation under a much broader charter and transferring it to New Haven under the direction of Prof. Johnson. There it opened in 1877 and there it has since remained.

The first bulletins of the New Haven station were issued in the form of single sheets, written by Johnson with the electric pen, for distribution to the newspapers of the State. I have a copy of the first of these, dated August 18, 1877, for your inspection. At this time all expenses of analysis were borne by appropriations from the State's general funds; the only fertilizer law on the books was still that of 1869, and the publicity given to the Station's analysis was relied on as the only means of controlling the quality of the fertilizers sold. It was not until 1881 that the suggestion was

first made that the costs of inspection be met by requiring manufacturers to pay registration fees. Curiously enough this proposal came, when it did come, from the manufacturers themselves. They were finding themselves obliged to register their products in other states, and did not wish to see manufacturers from out of the State able to sell their products without expense in Connecticut. At first Johnson was somewhat dubious about the bill, but finally agreed that it was sound, and actively supported it. It was passed by the 1882 legislature.

This 1882 law contained the following provisions (among others):

(1) All fertilizers were required to be labelled with "the chemical composition of the fertilizer, expressed in the terms and manner approved and currently employed by the Connecticut Agricultural Experiment Station."

(2) Two certified copies of the statements on the package had to be filed with the Station, together with a one pound sample of the fertilizer.

(3) An analysis fee of \$10.00 had to be paid "for each of the fertilizing ingredients contained or claimed to exist in said fertilizer."

(4) Dealers were required to report annually the names and addresses of the manufacturers whose fertilizers they sold, and to supply samples of the fertilizers on demand.

It is a curious fact that this law was broader than the one to follow it in that it did not limit the elements whose decla-



Frederick E. Gross, manager of Chase Bag Co. paper and paper bag division. Formerly of New Orleans, he will make his headquarters in Chicago.

ration would require payment of analysis fees to N, P and K. The Station itself at that time, however, apparently considered only these three elements to have any fertilizer value, and issued a statement that "The Station understands 'the fertilizing ingredients' to be those whose determination is an analysis necessary for a valuation, viz. Nitrogen, Phosphoric acid and Potash." Here is a case where if the Station authorities of that day had seen into the future more clearly, and had realized that some day farmers would be adding Mg, Mn and B as well as N, P and K to their crops, there would have been no necessity to amend the law in 1949.

The law of 1882 served the State for 37 years. In 1919 it was amended chiefly to impose a tonnage tax of 6 cents in addition to the analysis fees. However, the law was not only amended but completely rewritten, and in rewriting it the re-

Annual Report of the Connecticut Agricultural Experiment Station for 1949, p. 12.

striction in the imposition of analysis fees that the Station had established administratively became part of the law, which specified that the guaranteed analysis should state "(a) available phosphoric acid (per centum); (b) total phosphoric acid (per centum); (c) nitrogen (per centum); (d) equivalent ammonia (per centum); (e) potash soluble in water (per centum)." The 1919 law therefore made no provision for the declaration of minor elements, and indeed under a strict construction it might have been interpreted to forbid the declaration of these elements. In spite of this the law was on the books for 30 years, but modern trends in fertilizer practice, with the recommendations of agronomists for the addition of Mg and B, began to make it no longer adequate to meet the needs of the present day. Therefore in 1949 it was amended to require the payment of the \$10.00 fee for any element, major or minor, that might be guaranteed. There was

also a provision that permission of the director of the Station had to be obtained before minor elements could be added and guaranteed; this provision was inserted primarily to allow some measure of control if a manufacturer should add so large an amount of such an element as B that the fertilizer would be injurious to crops.

Through all these years the philosophy of the Station has been that if the farmers of the State were freely informed of the quality of all brands of fertilizer on the market through the publications of the Station this publicity would be a sufficient deterrent to the sale of substandard fertilizers. That this has worked is shown by the fact that in our 1949 inspection just completed 89 per cent of all guarantees were met or exceeded.

Except during the last war, when fertilizer grades were restricted by a Federal War Order, Connecticut has never had compulsory restriction of fertilizer grades. It has been the belief of the Station that farmers and manufacturers should be educated in the advantages to both of a limited number of grades, but that no one should be forbidden to use any grade, no matter how poor, if he wished to. Therefore the New England agronomists have regularly issued lists of fertilizer grades that they considered sufficient to meet the needs of New England agriculture, and the farmers have been apprised of these grades. That this non-compulsory grade limitation has been successful is shown by the facts that 86 per cent of the tonnage



Alvin Ball, left, and William P. Morrison, who have been added to the technical services staff of Spencer Chemical Co., Kansas City, Missouri.

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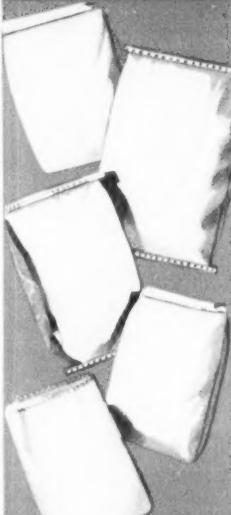
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of mixed fertilizers sold in Connecticut during the 1949 season was of the 10 recommended grades, and that only one grade not on the recommended list (4-12-4) sold as much as 300 tons.

Through the years there have been changes both in the fertilizers offered for sale and in the mechanics of their inspection. Nowadays our inspector can get in his automobile and in a few hours be in any part of the State. It was not so in the 19th century and the early part of the 20th. For local collections Mr. Churchill had a bicycle rigged up with a special carrier on the frame; a photograph of this hangs on our walls. Trips to the more distant parts of the State required first a journey on the train and then the hiring of a horse and carriage to reach the farms and the outlying dealers, with frequently an overnight stop at a country hotel. The number of brands of fertilizers registered first grew as the number of fertilizer manufacturers increased with the growth of the country, and then declined as a result of the campaign for fewer grades. In 1883, 38 firms registered 39 brands of fertilizer; in 1919, 43 firms registered 339 brands; and in 1949, 59 firms registered 230 brands. Most of the early manufacturers no longer exist, but two manufacturers who registered the first year the 1882 law became effective are still registering fertilizers in 1950: Rogers and Hubbard of Middletown and M. L. Shoemaker of Philadelphia. The latter company is now a division of Wilson & Co.

Since the time that with the growth of the Station its work became too diversified for the Director to run the laboratory

and administer the fertilizer law himself, and Johnson relinquished these duties to others, five men have been in charge of

fertilizer analysis and inspection: E. H. Jenkins, A. L. Winton, J. P. Street, E. M. Bailey and the present author.

SOIL SCIENTISTS MEET AT CONNECTICUT CELEBRATION

Forty-seven members of the Northeastern Soils Research Committee concluded a two-day session at the Connecticut Agricultural Experiment Station February 24 with election of officers for 1950.

Dr. Richard Bradfield of the Cornell Agricultural Experiment Station was elected chairman of the committee for the next two years, succeeding Dr. Firman E. Bear, New Jersey Experiment Station, who presided at the meetings. Dr. R. Q. Parks of the Division of Soil Management and Irrigation, U. S. Department of Agriculture, was re-elected secretary.

The members passed a resolution that "steps be taken for increasing the activity in obtaining a basic soil resources inventory of the United States." The resolution pointed out that soil is our greatest natural resource and that such an inventory is necessary for accomplishing better utilization of soils for such uses as agriculture, forestry, engineering and recreation. Dr. C. L. W. Swanson of the Connecticut Station heads the sub-committee on soil survey.

Plans were completed for an intensive regional attack on the problems of soil structure in the northeast, with five experiment stations to conduct research projects in this field. The five

stations are Connecticut, New Hampshire, New Jersey, Cornell (New York) and Pennsylvania. The sub-committee in charge is headed by Dr. F. G. Merkle of the Pennsylvania Station.

The importance of radioactive tracers as tools in agricultural and plant science research was stressed in a talk by Dr. Ernest C. Pollard, associate professor of physics at Yale University. Dr. Pollard cautioned, however, that these tools must be used correctly and must not be considered adaptable to every type of research. Following Dr. Pollard's talk, reports were given on work with radioactive tracers completed or now in progress at the New Jersey, Cornell and Maine experiment stations and the U. S. Department of Agriculture Plant Industry Station at Beltsville, Md.

Soil scientists attending the conferences heard reports from several subcommittees, covering their work of the past year. Some of the subjects under discussion were: pasture soils, phosphorus studies, supplemental irrigation, drainage, effects of herbicides and insecticides on soils and plant growth, and soil problems in production of potatoes and other intensively fertilized vegetable crops.

Experiment station and U. S. Department of Agriculture rep-

representatives from the six New England states, New York, New Jersey, Pennsylvania, Maryland, Delaware, West Virginia and Washington, D. C., attended the meetings.

"To push back the frontiers of knowledge . . . should be the first purpose of an agricultural experiment station," Dr. James G. Horsfall, director of the Connecticut Station said at the opening session of the conference.

"Minor Elements in Modern Fertilizers" was the subject of a speech by Dr. Vincent Sauchelli, Director of Research for the Davison Chemical Corporation, Baltimore, Md. The importance of major fertilizer elements, such as nitrogen, potassium and potash, has long been recognized, but only recently have the minor or trace elements, like

boron, come into the fertilizer picture.

Dr. F. E. Bear, head, department of soils, New Jersey Agricultural Experiment Station, emphasized the value of fertilizer, stating that "the fertilizer industry has made the most important contribution in growing food for man. Without fertilizer, the food needs of the people of the world could not be met."

Good soil management requires the use of inorganic fertilizer to produce larger plants. This adds organic matter to the soil and keeps it in good physical condition, he said. The fertilizers we are using have been deposited in their present locations by geologic action. We are simply moving them back to the soil from which they were leached centuries ago. He concluded,

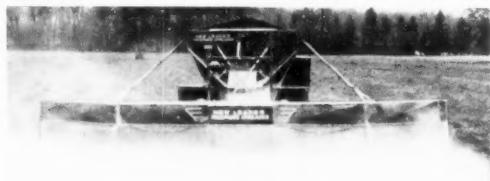
"In making this transfer, the fertilizer industry stands between man and any possible shortage of food for years to come."

Dr. T. E. Odland, head of the department of agronomy at the Rhode Island Experiment Station, outlined the functions of major and secondary plant food elements.

Mr. Ralph Donaldson, agronomist, Massachusetts Agricultural Experiment Station, described the Green Pastures contest for 1950 and showed a sound film on the program made last summer.

The day concluded with a banquet at the Hotel Taft, at which Dr. Russell Coleman, president of the National Fertilizer Association, was the principal speaker.

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Speakers at the opening session of the New England Fertilizer Conference, held at the Connecticut Agricultural Experiment Station, New Haven, are: Top picture left to right: James G. Horstall, Director, Connecticut Agricultural Experiment Station; Dr. Farman E. Borden, Head, Soils Department, New Jersey Agricultural Experiment Station; Dr. T. F. Odland, Head, Analytical Department, Rhode Island Agricultural Experiment Station; Dr. Vincent Sauchelli, Director of Research, Davison Chemical Corporation, Baltimore, Md.; and Ralph W. Donaldson, extension agronomist, University of Massachusetts.

Lower picture: E. S. Russell, Director, National Fertilizer Association; F. S. Lodge, Assistant to the President, NFA; W. A. Meeken, Director, NFA; R. F. Fraser, Director, NFA; Dr. James G. Horstall, Director, Connecticut Agricultural Experiment Station; B. B. Fall, Director, NFA; Dr. Russell Coleman, President, NFA; and Dr. C. L. W. Swanson, Head, Soils Department, Connecticut Agricultural Experiment Station. The conference celebrated jointly the 100th Anniversary of the founding of the American fertilizer industry and the 75th Anniversary of the Connecticut Agricultural Experiment Station.

The American fertilizer industry, 100 years old in 1950, has contributed to the stability of the United States by replacing the plant foods taken out of the soil by harvested crops, said Dr. Coleman. Other civilizations, have fallen because the soil has been depleted and plant nutrients not returned to it.

In its 100 years of existence, the fertilizer industry has made many contributions to the nation's economy, the association president went on. Today, the United States produces more food than we can use ourselves, making it possible to share with other countries which are unable to produce enough to meet their food needs. One contrib-

uting factor to this has been the use of fertilizers.

Dr. C. L. W. Swanson, head of the Connecticut Station Soils Department, spoke on soil structure and crop production. His experiments revealed that fertilizers were much more beneficial when organic matter was added at the same time.

Dr. H. A. Lunt, also of the Connecticut Station Soils Department, described the revolution in soil testing methods during the past 40 years. The "quick" test, developed by the late Dr. M. F. Morgan, former head of the Soil Department, is in constantly increasing use to guide farmers in application of the right fertilizer in economic

amounts. More than 70,000 samples of soil were tested by this method in New England last year, Dr. Lunt said.

Two problems of the tobacco industry were discussed by Prof. C. V. Kightlinger, agronomist, Massachusetts Agricultural Experiment Station. Experiments have shown that spring application of fertilizer to seedbeds has caused poor stands and unsuitable plants. Fall fertilization avoids these difficulties and is recommended by him. The other serious problems of production is caused by poor culture resulting from some rotations. Dr. Kightlinger prescribed addition of organic matter and use of cover crops to remedy this situation.

The history of fertilizer inspection in Connecticut was outlined by Dr. H. J. Fisher, head of the Analytical Chemistry Department of the Connecticut Station.

Prof. J. S. Owens, agronomist of the University of Connecticut, gave an illustrated lecture on the agriculture of Japan.

Michigan Conservationists Elect Van Aken

The (Mich.) State Association of Soil Conservation Districts met at Michigan State College, East Lansing, for their annual two-day meeting Feb. 15 and 16. Approximately 235 delegates, representing 57 districts, or, a total of 19,500,000 acres of Michigan's farm land, attended the sessions. The program included the regular annual meeting with reports of progress made by state conservationists.

Speakers included Dean S. T. Dana, head of the school of for-

estry and conservation at the University of Michigan; B. D. Kuhn, Michigan State College agricultural extension service; Dr. Arthur Mauch of the M.S.C. agricultural economics department; P. J. Hoffmaster, director of the state conservation department and member of the state soil conservation committee; and Dean Ernest L. Anthony of the Michigan State College of agriculture.

The group decided to request permanent representation on the executive council of the Michigan Agriculture conference, in place of alternating representation as is now the case.

Election of officers for 1950 found Herbert VanAken of Charlotte, former vice president of the association, taking over as president from Clayton Carpenter of Howell. Ray Anderson, Manistee, was elected vice president, and James Boyse, Allegan, reelected secretary.

MISSISSIPPI GRAZING TOUR

By GLENN C. RUTLEDGE

Sixteen states were represented among the 100 agricultural leaders who toured Mississippi to see some of the Southland's green winter pastures. Mild weather and adequate rainfall made conditions ideal for winter grazing crops. Lush forage crops were in evidence at all the points visited.

Sponsored by the National Fertilizer Association, the tour began at State College with a dinner on the evening of February 6 which was featured by an address by W. A. Minor, assistant secretary of agriculture.

The visitors saw grazing plots on the Mississippi Experiment Station farm Tuesday morning.

One group of steers is being wintered on rye grass and crimson clover, another on crimson clover and oats, and a third on ladino and fescue. Each plot received 200 pounds of superphosphate, 100 pounds muriate of potash and 200 pounds of ammonium nitrate at planting and each plot was stocked at the rate of one 462-pound steer per acre.

After inspecting dairy pastures in the vicinity of the college, the group left State College for Jackson, stopping en route to see the pasture program developed on the John R. Anderson farm in Madison County. Here well mineralized pastures are used like feed lots. Cattle

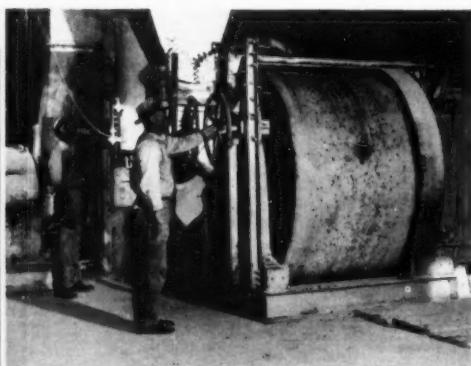
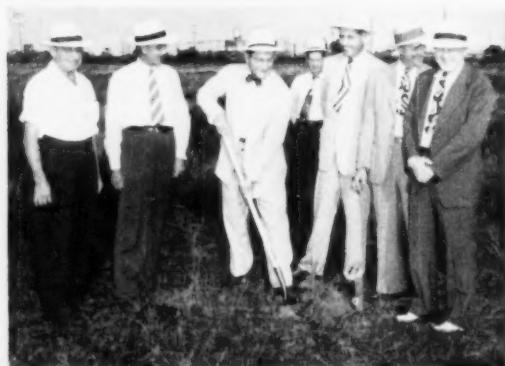
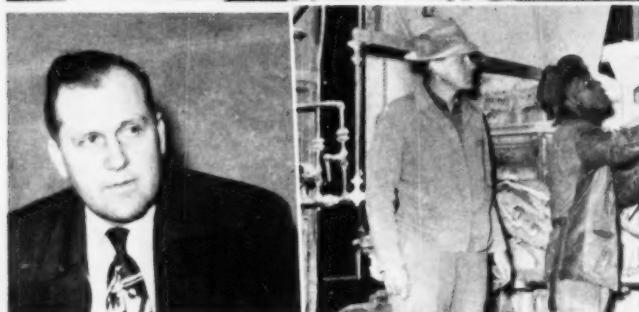
(Continued on page 32)

1. A group looks down from the skyline on crimson clover and kudzu in Upstate County. 2. Typical pasture tour stop. Dr. Ivan F. Miles, Bankeetropine, explains the layout to Dr. H. P. Cooper, Clemson, Dr. Russell Coleman, NFA president of the Ivan F. Miles, Mississippi State agronomist, Lowery Simmons, vice president, Mississippi Bankers Association. 3. W. R. Thompson, the great Mississippi pasture man with his demonstration bag of tricks seen last Fall at NFA. 4. Assistant Secretary of Agriculture, W. A. Minor, addressing the group.



PICTURES FROM ARKANSAS PLANT GROUND BREAKING

Top—M. D. Broadfield, general manager and Mrs. Broadfield, who serves as his secretary. Below them G. M. Measles, manager of sales and procurement. And in working clothes, A. N. Gentry, plant superintendent, on the job.



At the ground-breaking ceremony of the Arkansas Farmers Plant Food Company: M. D. Broadfield, general manager; Joe C. Hardin, board chairman; Ross Lawhorn, mayor of North Little Rock; Clifford L. Smith, executive manager; Ralph Hudson, president; R. P. Hall, secretary of the North Little Rock O. of C. 2. Modern equipment enables a shift of 8 men and a foreman to turn out 400 tons.

3. Three Pay loaders and belt conveyors handle all materials.

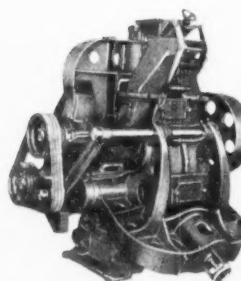
4. And so the goods come off the line, ready to haul away.

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Superphosphate
Ammoniated Superphosphate
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April, 1950

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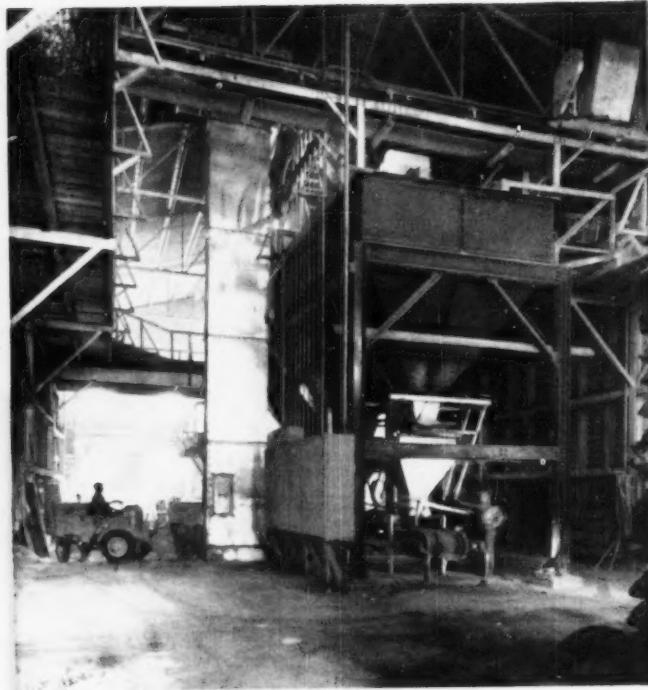
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FLORIDA

Foremost Fertilizer Company. Leesburg, has sent us the picture you see on this page of the new equipment installed last summer. The picture shows the hopper system, together with conveyor belts and scales. That's a Howe scale just visible back of the delivery end of the hopper. This is all part of a system of belts which conveys the materials from the cars into the bins.

N. A. Lockett, general manager, who sent us this photograph, has been with Foremost since August last year, and reports that travellers tell him theirs is one of the most modern small plants in the South. The equipment is doing its job, at any rate, because it has stepped up production, and put them in a good competitive position.

Coronet Phosphate Co. Plant City, as we noted briefly last month in *Press Time*, is moving its mining

operations from Hillsborough County to a 3,000 acre site six miles northeast of Lakeland. Actual operations will not begin until some time next year, according to B. G. Dabney, vice-president and general manager. The Seaboard RR is building a spur to the site and phosphate will be shipped by rail to Plant City where the processing plant will remain.

Mr. Dabney expects the new deposits to last ten to fifteen years, and believes it contains several million tons.

International Minerals and Chemical. Mulberry, has joined forces with local civic organizations to solve a housing shortage for their personnel. Recognizing that phosphate mining will continue at that point for perhaps centuries to come, the community has undertaken to build up a permanent settlement for the expanding corps of workers expected as phosphate and by-prod-

ucts develop. Several hundred workers are now commuting to Mulberry from surrounding communities.

GEORGIA

Southern Fertilizer and Chemical Co. Savannah, at its 45th annual meeting re-elected **A. D. Strobar** as president. Others elected were **W. Dewey Cooke**, vice president and secretary-treasurer; **Henry J. Sutcliffe**, assistant secretary; **Henry F. Inglesby**, assistant treasurer; **W. W. Harley**, sales manager; **A. D. Brent**, production manager, and **William Hugh Stephen**, counsel.

Directors elected by the stockholders, prior to the annual meeting, were Mr. Strobar, Mr. Cook, Mrs. Stephens, Fred Cockerell, J. B. Glover, J. W. Middleton and D. R. Livingston.

MARYLAND

Wm. B. Tilghman Company, Salisbury, publish a house organ known as *The Tiller*, as we have noted here before. The copy before us is Volume 7, No. 6 and it sustains a nice balance of interest, is typographically excellent, well printed—and generally must be very acceptable to its readers. Just now they are running an essay contest on conservation of our soil resources, with \$175 in prizes offered under—18 budding authors. We like especially a display line under a good cattle picture which reads: "It takes good soil to grow good steak." And another smaller heading which reads "How to grow greenbacks."

MISSISSIPPI

Magee Cooperative Gin, Magee, which is a gin, a mixing plant and a number of other things agricultural, has been expanding. Their storage capacity has been increased 7500 tons. They have installed Sackett continuous ammoniation with 30 tons per hour capacity. Equipment to use both solutions and anhydrous ammonia has been added. Complete shuttle conveyor systems for the handling of materials from cars to storage and base from the mixer to storage are in place. They have a Simplicity Engineering bagging machine. "All this," writes **B. A. Smith**.

Around the Map

manager, "in addition to what we have previously operated and shall continue to operate."

* * *

Mississippi Chemical Corp. Yazoo City, has appointed **Dan W. Jones** as chief administrative officer in charge of personnel, office and business procedures, Ernest L. Stewart, works manager has announced.

NEW MEXICO

American Metal Ltd. is planning to enter the fertilizer field with **Southwest Potash Corp.**, Carlsbad, a wholly owned subsidiary which will work a large deposit there.

NEW YORK

National Gypsum Company, Buffalo, expects to keep production at the present high level throughout the first half of the year, according to **Melvin H. Baker**, president, there being a good backlog of undelivered orders and sales are running ahead of last year. "Perhaps the most satisfying achievement of last year" said Mr. Baker, "was the demonstration by our organization of its ability to successfully operate the expanded business in a competitive market. It was the first year in which all National's expanded production facilities were in operation."

* * *

G. L. F. Soil Building Service, Ithaca, are beginning the first of this month construction of a new fertilizer plant on Cabbage Island at

Albany. **J. C. Crissey**, manager, writes, "This plant will be completely mechanized" he continues "and because of its location will be able to take advantage of water transportation on materials. The plant will have a capacity of 20,000 to 25,000 tons of fertilizer."

We would like to comment in passing on the attractively simple and dignified letterhead on which Mr. Crissey's letter was written—the name in simple type, and a grey-green print of the sculptured "GLF Quality" circle. Nice!

OHIO

Ohio Farmers Grain & Supply Association, Fostoria, have a fine new plant in operation. **H. B. Lee**, manager, sent us a nice little folder that has been distributed to their members. "Your Fostoria plant . . . working for you" is the main title. Inside are from boxcar to bag pictures and cutlines telling how the job is done. There is a message from the association president, one from Mr. Lee, one about plant super. **Earl Neuman**, the latter under a headline "Meet your hired hand." And on the back a picture of the bag with some selling copy that starts off "Your Ohio Farmers Fertilizer may look just like any other fertilizer—but it isn't."

TEXAS

Duval Texas Sulphur Co., Houston, has been granted SEC permission to issue new stock, change its name and go into the potash busi-

ness near Carlsbad. It proposes to offer 375,000 shares of no par value at \$13.50 per share and change the name to **Duval Sulphur and Potash Co.** They also will borrow \$2½ million and on the proceeds of this financing to build a plant and other facilities which will cost about \$7½ million and have a capacity of 720,000 tons.

President of the Duval company is **George F. Zoffman** of Houston, who also is a director and general manager of the company. Other officers are:

J. W. Cain, Houston, director; **E. Cockrell Jr.**, director; **Warren J. Dale**, Houston, director and vice-president; **N. C. McGowen**, Shreveport, director; **R. A. Shepherd**, Houston, director and vice-president; **L. V. Tracht**, Shreveport, director; **Eugene German**, Houston, treasurer and secretary; **V. J. Thornhill**, Houston, secretary and assistant treasurer, and **Ira M. Avent**, Shreveport, assistant treasurer.

* * *

Texas Farm Products Company, Nacogdoches, recently celebrated its 20th Anniversary. The local paper played it up with a special 8-page section giving the entire history of the concern. **M. S. Wright** is president.

CANADA

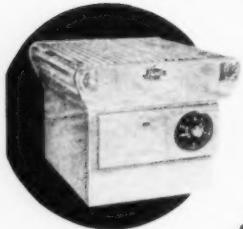
Special treatment at Hamilton, Ontario of the huge annual tonnage of garbage and sewage to replenish southern Ontario soil now being robbed of valuable minerals, is receiving more attention now that settlers from Europe are bringing more scientific land cultivation methods to the country of their adoption.

While obviously projects for the future, they are:

1—Incorporation in the proposed \$3,000,000 sewage disposal plant of an addition to convert the sewage into marketable fertilizer.

2—Composting of city garbage at the proposed jail farm in the Hamilton district, for use on farms.

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THAYER SCALE and ENGINEERING CORP.
HINGHAM, MASSACHUSETTS

**Swift Grants
For Science Studies**

Swift & Co. are supporting twenty-two basic scientific studies with grant-in-aid totalling \$120,000—bringing to more than two million dollars the awards by that company in the last ten years. Twelve are long-range agricultural studies.

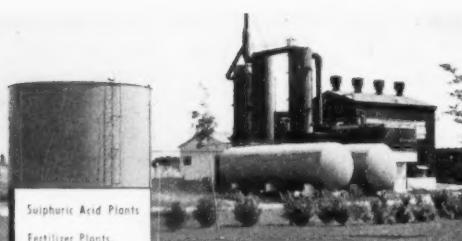
**Continental Gin
Opens New York Office**

To handle domestic and export activities of their industrial division in the East, Continental Gin Company, Birmingham, Alabama, have opened a New York office at Room 2407, 220 East 42nd Street, New York 17. Walter Gotta is district manager, and has had many years of experience in this field.

Continental, established in 1833, specialized in gin machinery until 1936 when they added materials handling and power transmission machinery which is now widely used in industry. Other sales offices are in Atlanta, Dallas, Memphis as well as in Birmingham.

**Ewer Brothers
50 Years With Bemis**

Two brothers, Frank M. and Arthur C. Ewer, have set a record of company service that is seldom equalled, each of them having celebrated the Golden Anniversary with Bemis Bro Bag Co. Both continue to be active in the management of the company, Frank Ewer of the Boston office as a vice-president and director, and Arthur Ewer



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CORPORATION

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as manager of the Bemis plant in Brooklyn. Both brothers joined the Bemis organization in the Boston office, Frank in November, 1896, and Arthur in February, 1900.

**Chase Branch
Wins Safety Award**

The Kansas City branch of Chase Bag Company was presented the Liberty Mutual safety award flag, in recognition of 500,000 man-hours of production without a day of lost time. W. J. Muller, manager, accepted the flag for the plant. Two other Chase plants have recently been honored. Chagrin Falls won the Greater Cleveland Safety Council campaign. Reidsville also completed half a million man hours without a lost time accident.

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are the perfect conditioner for
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- ✓ Scientifically dried and ground especially for fertilizer conditioning.
- ✓ Available in fine ground No. 16, medium ground No. 14 and coarse ground No. 12.
- ✓ Used and preferred by leading fertilizer manufacturers.
- ✓ Available in large volume the year 'round.
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World's largest year 'round supplier of rice hulls to fertilizer manufacturers

"If a man believes in something he can do wonders with it. The coal business is in the doldrums, Lorenzo. I'm ready to pull out of it and you and I will go into the fertilizer business."

So spoke Wiley G. Toomer to Lorenzo A. Wilson and thus it was that the present large operations of fertilizers, insecticides, and dock facilities, came into being.

North Florida was a land of piney woods and scrub oak when, in 1893, Wilson, a young salesman, was peddling his wares along the dusty wagon trails which served as highways. He had come to Florida to escape the severe winters of his native Canada. Fired with enthusiasm for the mild climate, he soon became convinced that if the farmers who eked out a bare existence from the inadequate soil could be taught to overcome that soil's deficiencies through fertilization, fortunes could be made in agriculture.

Young Wilson knew and understood his customers. He sold them feed and medicine for their livestock and fertilizer for their experimental groves of citrus trees, among other items, and they soon learned to depend upon his advice regarding their agricultural problems.

Setting up headquarters in the booming frontier town of Jacksonville, Wilson met Mr. Toomer, a genial man some 20 years his senior. Mr. Toomer was head of the Alabama Coal Company and was impressed by the young man's radical ideas regarding the agricultural possibilities of the state.

Wilson & Toomer

By MABEL P. MOYER

For the first three years, the company simply increased Wilson's heretofore small shipments of fertilizer from New York, making deliveries by boat as far south as Sanford, on the St. Johns river.

"Mr. Wilson and Mr. Toomer would take their horse and buggy down to a farm or small citrus grove and make a demonstration," recalls H. C. Hore, retired employee and executive of the company from 1893 to 1938. "A few months later the farmer would see the results. From then on he was a steady customer."

The business prospered and it was felt that the partnership should be incorporated. This was done in 1896 and a warehouse was leased.

In 1905 the first plant was built on Talleyrand Avenue, the present site of the company.

That same year, a sulphuric acid plant was constructed—one of the first in the south—marking a great advancement for the industry. Until then, sulphuric acid had been manufactured by the company from pyrites ore shipped from Spain. This ore contained 46 to 50 per cent sulphur. With the new plant in operation, pure brimstone was shipped from Texas and increased quantities of sulphuric acid, and, in turn, super phosphate, were manufactured with greatly reduced overhead.

In 1905 also, a new personality appeared on the scene. Bayless W. Haynes, an active and ambitious young salesman, was employed as bookkeeper. He rose from bookkeeper to become president and chairman of the board of directors, serving until his death in 1947. He became a national figure, twice serving as president of one of the national fertilizer associations.

According to veteran employees of the company, it was the dauntless team of Wilson and Haynes, Mr. Toomer having passed on in the early 1900's, that accounted in large measure for the company's early success. Undismayed by fire and pestilence, they pressed on toward a goal of continuous expansion and improvement.

After several years' discussion, about 1920, the company decided to enter the insecticide business. The executives reasoned that "We are the providers of soil nutrition that makes plants and trees grow and thrive, thereby becoming more susceptible to the hordes of insects that exist in this sub-tropical climate. It is a vicious circle and a growing problem."

It seemed desirable that this should be a separate company and so Florida Agricultural Supply Company—FASCO—was organized. In 1926 the home office was moved to Orlando. With the completion of an ultra-

---1893 to date

modern plant on the Talleyrand Avenue site in 1949, the activities of FASCO were again located in Jacksonville.

Here, in one of the largest, most completely equipped insecticide factories in the country, are manufactured pesticides, which are sold and used on fruit and vegetable areas throughout the southeast.

A FASCO product of the middle 30's is now known as "IFN." This "insecticidal, fungicidal, nutritional" product is being used to a great extent by Florida cit-

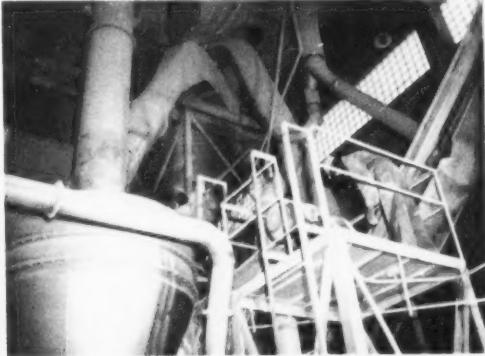
rus grove men who have discovered that they can make a spray from this product which actually kills insects, destroys fungi, and at the same time, nourishes the tree. Among other things, it contains traces of manganese and zinc, which are so necessary to fruit growth in certain substandard soil areas.

The dock facilities and giant conveyor system at the Wilson & Toomer plant make it possible for the company to handle tremendous tonnages of minerals and other bulk materials

Top left is the ultra-modern home of the Wilson & Toomer division, Florida Agricultural Supply Co., Jacksonville—one of the largest producers of insecticides in the South.

The great sulphuric vats at W & T in Jacksonville have a ca-

pacity of 1400 tons per week of 63% sulphuric. Aerial view of the W & T plant in Jacksonville. A sulphur grinding mill at FASCO, which will handle 4½ tons an hour, and is running 24 hours a day these days. It is a Raymond Roller Mill. And finally a St. Regis packer at work.



with great dispatch and efficiency. The system is designed for discharging and loading both bulk and bag material. Thirty feet of water at mean low tide is available at the dock, thus enabling the company to handle vessels as large as the Liberty and Victory types.

Wilson & Toomer Fertilizer Company has sales offices and warehouses in nine important citrus and agricultural centers in Florida. Sales representatives have headquarters in eight other Florida cities, while there are more than 200 company agents scattered throughout the southeast.

The sales organization for Wilson & Toomer and FASCO is identical within the state of Florida. The warehouses in Florida carry stocks of both fer-

tizer and insecticides. Outside the state, however, separate sales forces are maintained.

Within the last six months a strikingly new and different label has been developed for packages and bags of the company's products. Differing from standard labels which carry simply the brand name and list of ingredients, this new label is a decalcomania depicting a typical Florida orange grove in bright colors. The brand name and ingredients occupy secondary space on the container.

On property adjoining the Wilson & Toomer plant on Talleymann Avenue is the Southern States Bag Company, a subsidiary company, which manufactures a complete line of burlap and cotton bags. Its president is George D. Green.

The Cartledge Fertilizer Company, at Cottontale, Florida, and the Peninsular Fertilizer Works, at Tampa, are divisions of Wilson & Toomer. Both of these are modern fertilizer plants, the Cartledge being an acidulating plant and the Peninsular a dry mixing plant.

J. Albert Woods, who served in the Marine Corps during World War I, is the head of this tremendous industry today. Starting as a salesman for a nationally known fertilizer plant, he rose to become its vice president and director. Resigning in 1934, he joined Chilean Nitrate Corporation as vice president and director. Five years later he became president of this corporation. In 1946 he became vice president of W. R. Grace &

Company, of New York, which position he resigned to join Wilson & Toomer.

Mr. Woods is a regent of the University of the South, of which he is also an alumnus. He is a director of the Barnett National Bank of Jacksonville and recently was elected to the board of directors of Commercial Solvents Corporation of New York.

B. R. Fudge, PhD., is chief horticulturist for Wilson & Toomer. Dr. Fudge distinguished himself while serving as biochemist at the Citrus Experiment Station of the University of Florida, where for 18 years he successfully worked out plant nutritional problems.

R. S. Jones, B. D. Barber, and W. B. Hicks are vice presidents,

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In addition, FUR AG has the properties you expect in a good conditioner. It speeds up curing in the pile, helps prevent mixed goods from caking and provides bulk. Best of all, FUR AG is produced and available in volume the year around. More complete information on request.

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PASTED VALVE . . . PASTED OPEN-MOUTH . . . SEWN OPEN-MOUTH

each having specific departments of the business under his supervision.

George D. Hore is secretary and Fred F. Coffee is general superintendent of all Wilson & Toomer plant operations.

The direction of the FASCO division is under M. C. Van Horn, manager; R. C. Price, sales manager; and Julian H. Jackson, production manager.

TOUR

(Continued from page 31)

are turned over frequently, being sold as soon as a reasonable profit can be realized. Then more cattle are acquired through which to market the grass the farm produces.

At a dinner in the Heidelberg

Hotel in Jackson, the visitors were guests of the National Fertilizer Association. W. R. Thompsons, the Mississippi Extension Service "pasture man" and principal speaker, outlined the possibilities of greater livestock expansion in the South.

Wednesday was spent inspecting pastures in Hinds, Copiah, Lincoln and Walhall counties. In the two latter counties, tours were organized to show outstanding community-wide work. Dairymen and beef cattle producers had luxuriant winter pastures in top condition to show the out-of-state visitors.

The tour ended at Biloxi where most of the group attended the annual meeting of the Association of Southern Agricultural Workers.

OBITUARIES

C. Parks Anderson, vice president and director of the Superior Fertilizer Co., Tampa, Florida, in an Atlanta hotel of a heart attack, February 27. He was president of the Florida Association of Soil Conservation District Supervisors, a citrus grower and an officer and director in numerous agricultural organizations and enterprises.

Henry Eldridge Perry, 60, president of Commercial Solvents Corporation, in New York, March 16, as the result of a fall from his office window.

John Thomas Upton, 82, retired scalemaster of West Coast Fertilizer Company, in Tampa, Florida, March 8.

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MAILING ADDRESS: P. O. BOX 1685 ATLANTA 1, GA

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| Baltimore, Md. | San Juan, Puerto Rico |

In the Field of

FARM CHEMICALS



Board of Directors of Arizona Agricultural Chemicals Association. A. V. Smith, Pacific Guano Co.; E. O. Foster, Capital Feed & Seed Co., Vice President; F. B. Harbour, Tovrea Land & Cattle Co., President; H. M. Bales, Arizona Pest Control Co., Secretary-Treasurer; F. M. Feffer, Arizona Fertilizers, Inc.

ARIZONA AGRICULTURAL CHEMICALS ASSOCIATION

By F. B. HARBOUR

As you know, our Association is now only a little over a year old and we still have far to go toward accomplishing our mission. We are making progress however, along several lines. Our principal project for 1950 is the establishment of a joint University-Extension Service-Industry Soil Improvement Committee. This committee is currently being established and its purpose will be to promote long range fertilizer experimental programs designed to furnish much needed information. Since Arizona is the baby state, we need more information than we now have regarding specific grades most suitable to our various crops and soil types, and the timing and placement of these fertilizers. It is the desire of our Association to assist the University in every way possible in carrying out much needed experimental projects.

Another project for this year is cooperation between our Association and the Arizona Agricultural Airplane Operators Association with a view toward improving the quality of Airplane applications of Insecticides. A committee has been formed to work with the Airplane Operators on this program and we feel sure that improved performance by the operators will result.

The possibility of establishing a qualifying procedure for Field Representatives of Member Companies is being examined. The advisability of such a procedure will be determined and if this action seems advisable, a program for qualifying Field Representatives is to be developed.

In addition to the above functions, a Legislative Committee has been established to handle all Legislative matters effecting the industry, which may arise from time to time. This committee will also promote favorable legislation.

While our Association is young and has yet far to go, we feel that we are heading in the right direction and that the Association will fill a definite need in our industry.

NACA MEET

APRIL 20-21

National Agricultural Chemicals Association is scheduled to meet April 20-21 at Haddon Hall, Atlantic City. The program will be one of current interest to all who make, formulate or sell farm chemicals, according to Lea Hitchner, executive secretary, though there will be subjects of basic interest only to members. However, no meetings will be closed.

New Method of Insect Control In Making

New chemicals that make plants toxic to insects for short periods are being tested by scientists of the U. S. Department of Agriculture, Dr. P. V. Cardon, Research Administrator, said today. These chemicals kill insects that suck the juices of treated plants. They are known to the entomologists as "systemic poisons," and should not be used by the public until tested further.

Studies now are being made to find out if these insecticidal chemicals will break down into harmless compounds within a few days or weeks. If they do, a new approach will be available to American agriculture in the control of some of our most difficult insect pests, according to entomologists of the Bureau of Entomology and Plant Quarantine.

The chemicals are being applied experimentally by the entomologists to plants being protected from insects by soil applications, seed treatments, and spray or dust applications to foliage. The treated plants ab-



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Lion's recently expanded Chemical Division is now ready to supply all your nitrogen requirements!

LION Anhydrous Ammonia

Use of this material for direct application to the soil has been proved to be both economical and highly efficient in crop production. Accurate chemical control throughout the process of manufacture assures uniformity and high quality in this basic Lion product. Aqua Ammonia, now being used in certain areas for direct application, is also available.

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Made specifically for the manufacturing of mixed goods. This product supplies both ammonia nitrogen and nitrate nitrogen in desirable ratios. Easily handled, and available in three types, designed for varying weather conditions and formula requirements, for the production of fertilizers that cure rapidly, store well and drill efficiently.

LION Ammonium Nitrate Fertilizer

In great demand because of its low unit cost (33.5% guaranteed minimum nitrogen) and superior qualities. The improved spherical white pellets are freer flowing and have increased resistance to caking, with better storing qualities.

LION Sulphate of Ammonia

Use of this material enables the manufacturer to produce the high-analysis mixed fertilizers which are increasingly in demand by farmers. In the form of large white crystals which flow freely and resist caking in storage. Shipped in bulk and in 100-pound bags.

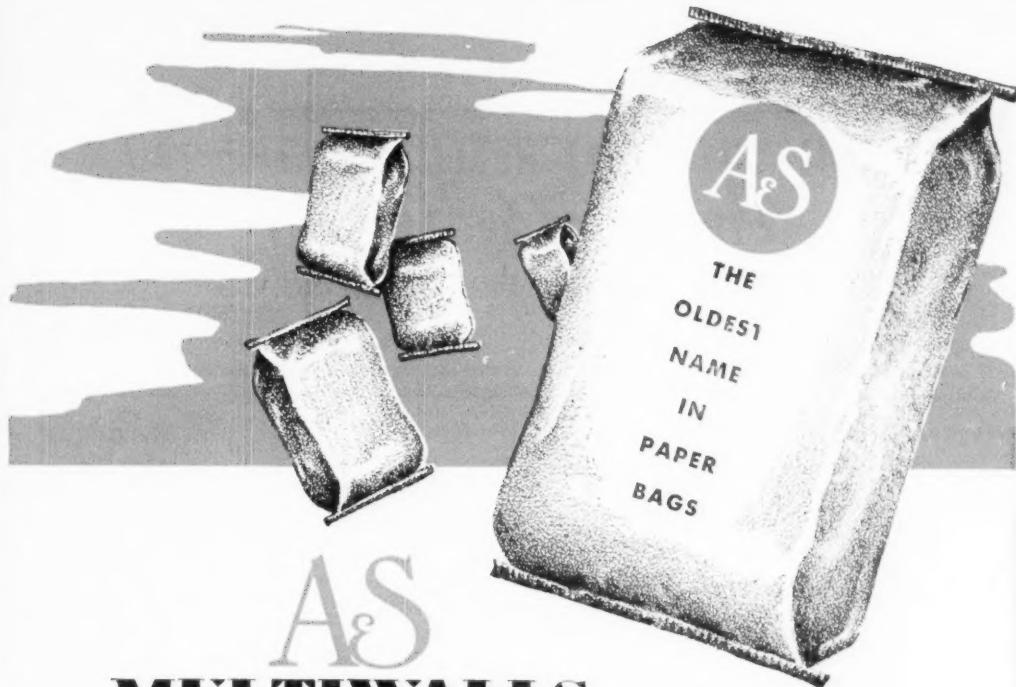
Technical advice and assistance to fertilizer manufacturers in solving their manufacturing problems is available for the asking. Just write.

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Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

• A&S Multiwall bags *stand up* under all kinds of shipping and storing abuse, because every ply is made of No. 1 specification kraft, and every bag must pass the rigid A&S spot inspections.

A&S Multiwalls *stand out* because they are printed on modern 4-color presses that reproduce a bag design in eye-catching colors unsurpassed in commercial bag printing. Why not have our A&S packaging specialists analyze your packages? These men know how to build impact into the flat exterior of what could otherwise be a dull and unimaginative package. This combination of unusual design and faultless printing is yours at no extra cost.

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sorb these insecticides and distribute them to all parts through the sap. Insects feeding on the treated plants are killed.

Chemicals most suitable for this purpose in tests, so far, are derived from the inert calcium phosphate rock, basis for our most common agricultural fertilizers. This abundant source of the basic insecticidal chemicals is treated to obtain pyrophosphoric acid, or oxidized to obtain phosphoric penetoxide. A wide variety of insecticidal chemicals can be derived from these sources.

The number of compounds that can be obtained from the calcium phosphate source is legion, the chemists of the Department say. Relatively few of them are known, and only a fair start has been made in testing those that are available.

The chemists emphasize the importance of the fact that these materials appear to break down into harmless substances. Some of them appear to be highly selective in the insects they will kill. One kills aphids and mites and apparently none of the other insects on the plants. Studies are needed to determine their effect on beneficial insects such as bees, parasites, and

predators.

One of the chemicals applied to the soil will kill European corn borers, in the stalks. Another kills aphids and mites on cotton when tiny amounts of the chemical are applied to the cotton seed prior to planting. Another kills greenbugs when applied as a spray to growing wheat. In the greenhouse, resistant mites are killed with applications of aerosols containing one of the systemic insecticides.

The entomological discovery of these new materials has renewed interest in the idea of controlling insects by injecting or applying insecticides that will be taken into the plant tissues so that insects feeding on them will be killed. Bureau entomologists have studied the problem for many years. But none of the chemicals studied until recently have warranted further investigation.

Supply Outlook For 1950 From John Powell & Co.

Generally, there is a tightening of supplies of Pyrethrum, Sabadilla, DDT, and BHC.

BOTANICALS: Previous estimates of the Pyrethrum situation are proving quite accurate. Inventories continue low; demand has been strong; prices are firm; and

conditions abroad will not increase import availabilities.

"Synthetic Pyrethrum," while progressing, cannot be expected to ease the Pyrethrum situation, at least during early 1950.

ORGANICS: BHC and DDT both moved freely during 1949, after unusual inventory depletion because of heavy infestations last summer. Thus, no heavy carry-over existed this year. Further, replacement supplies are already being withdrawn; an early opening of the season seems likely (particularly in some areas); and the prolonged coal strike has already affected one vital raw material—Benzol.

Our other major materials, such as Cube, Toxaphene, Chlordane, and 2, 4-D, seem to be in satisfactory supply. However, even here, because of over-all production and shipping demands, it is recommended that preliminary withdrawals be made.

The 2, 4-D situation though, could change. In 1949, because of weather conditions, the movement of 2, 4-D was substantially less than original estimates. Normal production was tapered off and stocks at the year end were smaller than in previous years. Now due to a decrease in Phenol output (also a result of the coal strike), not all 2, 4-D plants are operating at capacity. 2, 4-D could, therefore, become a relatively short commodity—particularly with any kind of a favorable weather break.

CONCLUSIONS: We believe contractual customers should start withdrawals to anticipate their needs and avoid possible delays during periods of peak demand.

THE FERTILIZER INDUSTRY IN THE PACIFIC NORTHWEST

By A. O. BARTELL

Raw Materials Survey

While this report is concerned primarily with the fertilizer industry in the lower Columbia River Basin, industrial materials do not recognize boundaries. Rather, such factors as location of raw materials, location, size and character of markets, and cost of distribution determine the area to be considered as a unit. Therefore, this report is necessarily concerned with production and consumption of fertilizers in all of Idaho, Oregon, and Washington. The study does not include the production or use of soil amendments such as agricultural limestone, but does include the consumption figures for gypsum and sulphur.

Summary

Sixty percent of the nation's reserves of phosphate rock lie in the Western States of Idaho, Wyoming, Utah, and Montana. There has been a rapid growth in the consumption of fertilizer in the Pacific Northwest—so rapid in fact, that Western production has lagged behind the demand. Population in the Pacific Northwest is rapidly increasing. The depletion of the fertility of Western soils is estimated to be twice the rate of replacement by fertilizers. These factors point to an expanding fertilizer industry in the Pacific Northwest.

The expansion of the industry can be illustrated by considering the record of the three states. The 1943 consumption was 103,969 tons, and 1948 statistics show that 251,942 tons were consumed—more than a two-fold increase in five years. Estimates are that the Western consumption of phosphate for 1960 will be at least double the present consumption.

As to new products and techniques, the trend is toward higher analysis materials such as triple superphosphate. However, the use of phosphoric acid from elemental phosphorus is not in the immediate future. The industry is watching the results of direct application of gaseous ammonia with considerable interest, but some skepticism. Application of dry fertilizer by low-flying airplanes is proving very successful in some parts of Oregon.

The marketing pattern is as follows: Primary producers such as Consolidated at Trail, B. C., and Anaconda in Montana, are represented by brokers who sell carload lots to the mixing plants. The mixing plants compound the materials and wholesale the mixtures under their brand names to retail outlets. The mixing plants also act as wholesalers of the simple materials. A large part of Oregon's consumption is handled through farmer-owned cooperative mixing plants which supply "co-op" affiliated retail outlets.

Production

At the present time there are eight producers of primary fertilizer chemicals in the Pacific Northwest. Another, a superphosphate plant, is now being constructed by Stauffer Chemical Co. at Tacoma, Washington. It will use sulphuric acid from American Smelting and Refining Company's recently completed acid plant at Tacoma, and rock phosphate from Sage, Wyoming. Another producer that could contribute to the fertilizer industry when and if it becomes economically feasible to do so, is the elemental phosphorus plant recently constructed by Food Machinery and Chemical Corp., the new company organized

by Food Machinery Corp. and Westvaco Chemical Corp. at Pocatello, Idaho. Production is now going into food and industrial phosphate chemicals. Press accounts state that the company is also working on the thermal process of nitrogen fixation at their pilot plant at San Jose, Calif. This could mean the future production of ammonium phosphate.

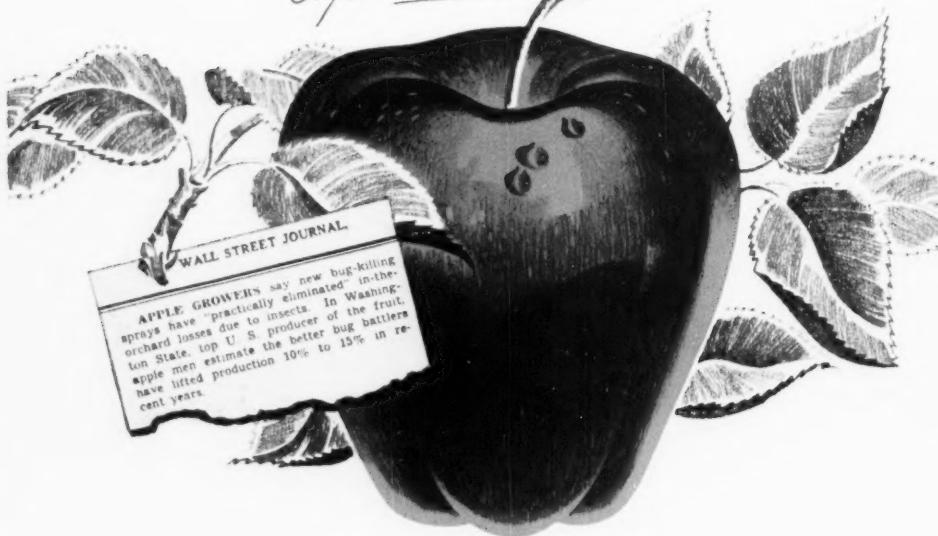
A recent press release promises early construction of another primary producer in the Pacific Northwest. The newly-organized Columbia Electrochemical Phosphate Company has announced a \$4,000,000 electric furnace plant to be constructed at Cascade Locks, Oregon. Montana phosphate rock will be treated by the TVA electrothermic process to produce triple superphosphate.

The Chemicals Division of Pacific Supply Cooperative confirmed the recent report that they have joined with other northwest farmers' co-ops in the acquisition of a large phosphate rock deposit in southern Idaho. When asked if this marked their entry into primary production, they replied that a triple superphosphate plant "was being considered."

The biggest supplier of primary fertilizer chemicals to the Pacific Northwest is the Warfield chemical plant of Consolidated Mining and Smelting Co. at Trail, B. C. SO_2 stack gases from Cominco's lead zinc smelter are treated in a contact-process plant to yield 1,100 tons/day of sulphuric acid. The acid is combined with phosphate rock from the company's mines in Montana to produce phosphoric acid and with ammonia from their water-electrolysis and air-liquefaction plant to produce ammonium sulphate. Ammonia

(Continued on page 68)

Apple production "up" 10 to 15%!



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Green Pastures for Sale

By F. M. Nuss

"Green pastures for sale" is the successful theme note of an aggressive educational program promoting human nutrition through soil reconstruction. Sponsor of the greener pastures project is the Marine By-Products Fertilizer Company of Seattle and Portland.

The program, inaugurated early this year in Washington, centers around a technicolored film presentation of soil restoration. Directed by Dr. William Albrecht, chairman of the Department of Soils, University of Missouri, the film traces malnutrition to deficiencies in minerals. It shows animals, mineral conscious, selecting grasses grown on good soils and spurning those, in the same pasture, grown on inferior land. Crop diversification based on heavy grasses not only restores vitality to the soil but to its produce and to people eating that produce. Health, it demonstrates, is related to the soil.

Willis R. Lebo, founder of the Marine Company and a personal friend of Dr. Albrecht, states, "It is a pleasure to get a wide audience in order to expound Dr. Albrecht's theories." The theo-

ries of Dr. Albrecht coincide with many of those of Mr. Lebo who has spent 30 years in Alaska experimenting with various fertilizers made from fish scraps.

Film audiences include agricultural classes in public schools, Future Farmers of America, Veteran Agricultural Courses, and contractual farmers under the auspices of participating cannery associations. Following film showing on a 16 MM machine, duplicate slides of experiments by agricultural experimental stations are shown to demonstrate effectiveness of soil reconstruction and healthier vegetation.

During the questions and answers session following the showings, the following topics are considered: how fertilizers are made; comparison of fertilizer values; waste of money for fertilizer application on lands with improper drainage; what successful growers use; how fertilizer needs are determined; which fertilizers are beneficial to specific soil types; and results of surveys in the midwest where natural phosphates have been applied extensively.

Folders, printed by the Marine

Company, are distributed explaining a three point program for maintaining permanent soil fertility: 1. Determination of soil type; 2. Sowing of legumes; 3. Applying natural phosphate at the rate of 1,000 to 1,500 pounds per acre—a planting sufficient for 8 to 10 years usage. Results, folders proclaim, are enriched soil, increased bacterial action and lower fertilizer costs.

Movies are only one part of the educational campaign. The enterprising firm acquired a six-ton fertilizer truck capable of spreading 40 tons of bulk fertilizer daily. Demonstrating, it can spread a 24 foot layer of fertilizer in one application for a particular soil. Too expensive for the average farmer whose soil needs it once every eight to ten years, the truck can be operated by special applicators or farm co-operatives.

"After 35 years in fertilization work," Mr. Lebo states, "I have come to the conclusion that in these days of crop surpluses, it is necessary to adopt a new fertility plan."

Proposed is heavy treatment of soils with natural phosphate and lime where soils are hydrogen bound and a cover crop of legumes to increase the soil's organic matter. That means greener pastures; greener pastures means more beefsteaks which are not a short commodity and quality produce with high mineral content. If the soil is put in shape to grow good cover, the soil's nutrients are conserved from inroads of erosion, Mr. Lebo says, and wider areas are opened as the home for increased bacterial population.

(Continued on page 67)

Robert F. Terhune, for fifteen years territory manager for Armour Fertilizer Works, traveling this area, saw opportunity for establishing a fertilizer plant in this, the center of the tobacco belt of Kentucky. Forming a partnership with J. B. McConaughay, well known business man of Winchester, the plant of the Kentucky Fertilizer Works was built in 1945. From that time the works thus until Dec. 31, 1949, when the partnership was dissolved and Mr. Terhune sold his interests to Mr. McConaughay, including the registered patent trade brand Terhune Kentucky Plant Food Fertilizer

Located at the southeast edge of Winchester, county seat of Clark County, operation was started in March 1946, specializing in "Fertilizers Made for Kentucky Soils."

Said Mr. McConaughay when interviewed recently, at his office, "95% of our production is for Kentucky Burley—6-8-6, 4-12-8, 5-10-5 and 3-9-6 the major analyses."

He stated further "The decision to specialize in tobacco fertilizer was based largely on the reliable authority of Chas. D. Shouse, agricultural extension worker in Clark County. According to Mr. Shouse the Burley Belt of Kentucky has an approximate annual production of 150 million pounds of tobacco, Clark County alone producing about ten million pounds. Other counties in this rich Burley Belt are — Montgomery, Madison, Harrison, Bourbon, Franklin, Shelby, Fayette, Scott, Jessamine, Mercer, Woodford, Fleming and Mason.

Kentucky Fertilizer Works

By C. M. TEMPEI

The plant, strategically situated near the Louisville & Nashville and the Chesapeake & Ohio railroads is a concrete block and frame structure, 300 ft x 60 ft., with metal sides. The separate one-story office building of four rooms, is nearby facing the highway.

Equipment includes automatic scales and a Union Special bag closing machine. The bagging unit has a production of 150 T per day. The mixing unit, it was stated, mixes approximately 15 T. per hour, or an annual total tonnage of 12,000 T. Multi-Wall paper bags are used.

Said Mr. McConaughay, "We started, in the spring of 1946, a spreading service for farmers at no additional cost to them. Fertilizer, still sold largely in bulk, through dealers, such orders are sent on to us by the dealers. The fertilizer is then delivered direct from our Works to the farmers, and when the terrain is favorable, with the use of a Baughman fertilizer spreader, through an arrangement with a local spreading concern, the fertilizer is spread on the land."

"Our saving in labor and bag costs," explained Mr. McCon-

naughay, "enables us to give this splendid spreader service free of charge."

One year's trial of this plan seems to have proven satisfactory both to the farmer and the Fertilizer Works, the latter having the added advantage of eliminating the curing necessary in bagging.

"It is essential to use sulphate of potash instead of muriate of potash, for use in soils for growing tobacco, which, throughout this section are deficient in potash." For lime content, dolomite limestone is shipped in from Tennessee.

The Kentucky Fertilizer Works, representing an investment of \$160,000 operates over a radius of something like 100 miles around Winchester, their output being disposed of through 400 dealerships — wholesale houses, seed and feed dealers, hardware implement merchants and general stores in the rural sections, under the brand—"Terhune Kentucky Plant Food."

There is a bright outlook for future growth, in the fact that Kentucky Burley growers are fast becoming more and more

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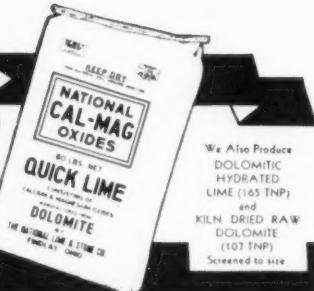
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scientific minded, as evidenced by the growing demands at soil testing laboratories—twelve of them—located at county seats of the leading Burley counties. The one established, early the present year, in Winchester, for Clark County by County Agent Shouse, was largely made possible through the encouragement of The Kentucky Fertilizer Works.

Two new tobacco warehouses were built in Winchester in 1949, at a cost of about \$250,000 each. This, with the old Winn Avenue warehouse gives Winchester market three large warehouses.

According to County Agent Shouse, approximately 11 million pounds of leaf were sold

from these floors the present season, at a total of almost \$5,000,000.00, of which \$3,750,000 went to Clark County growers. The average per pound was 44 cents.

Eighteen employees include operators of machines and two Hough Pay loaders.

J. B. McConnaughey, a native of Hillsboro, Ohio, came to Winchester, Ky., in 1921. He has been operating an auto-finance and insurance business, which interests he continues, with offices located in the McElroy Building, at Court House Square and also at the factory.

Mr. McConnaughey is Past President of the Rotary Club, a

member of the Board of Trade and other civic organizations; also an active member of the First Christian Church of Winchester.

Benjamin Lipscomb has served the Kentucky Fertilizer Works since its organization, as factory superintendent. J. P. Eades is assistant superintendent.

Eugene Cecil, for many years salesman with National Biscuit Co., is salesmanager.

B. M. Dickerson is disbursing clerk.

Mrs. J. B. McConnaughey, wife of the owner, and Frank Eton have charge of accounting and other office duties.



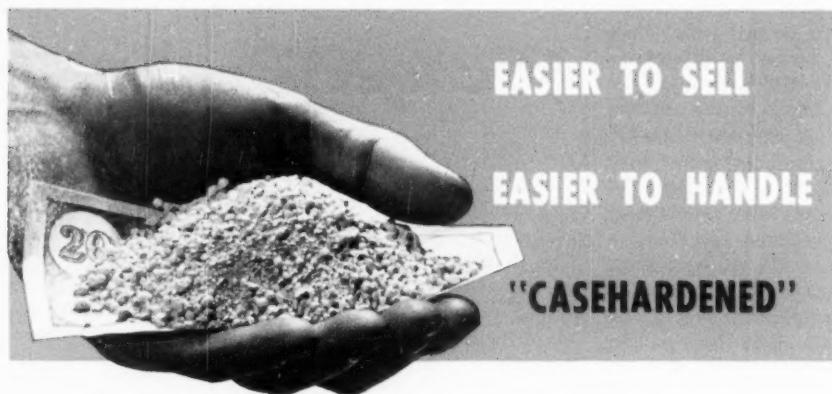
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Thanks to commercial fertilizer, a huge segment of Alabama's land and people have been restored to wealth and prosperity. And due largely to the untiring work of an experiment station superintendent, fertilizer dealers in the Black Belt towns of Alabama have found sales climbing to phenomenal heights.

For this is the story of K. G. Baker and his contributions to the Black Belt. The two go together like Sam Houston and Texas or Robert E. Lee and the Confederacy. "Baker of the Black Belt" is known far and wide in Alabama. That's why he was named "Man of the Year" in Alabama agriculture a few years ago by **Progressive Farmer**. Fertilizer manufacturers and dealers heartily agree with the farm magazine in its nomination of Baker.

Thanks to commercial fertiliz-

Baker and Carl C. Morgan, district conservationist, knee deep in oats running fifty bushels per acre, and the volunteer black medic stimulated by the phosphate.



Fertilizer Revolutionized

By HAROLD SEVERSON

er and Baker's work, a great strip of country has been rescued from soil erosion and general decline. More than one and a quarter centuries ago, farmers began raising wonderful crops of cotton in the Black Belt. This strip of waxy black soil, extending 170 miles long and 20 miles wide across the central part of the state, was wonderfully fertile. From it came bumper crops that enabled farmers to build fine mansions and make small fortunes. They paid little attention to the stealthy encroach of a farmer's worst enemy—soil erosion. They continued to cultivate their fields as cleanly as

possible. Consequently, the stiff heavy clays began to wash away.

That was one form of trouble. Johnson grass was another but it too could be disregarded. Hoe hands could chop it out of the fields. It furnished good grazing for work stock. It had its uses.

But the third enemy was one that could neither be disregarded or combatted successfully. It was the boll weevil. It arrived in the Black Belt in 1914 and changed the entire story of farming. King Cotton's regime was at an end. The heavy winter rainfall on the stiff clay soils prevented early planting of cotton. Black Belt farmers could not rush their cotton crops to maturity ahead of the boll weevil as was the case on lighter soils. As a result, this territory suffered heavily from the pest. Many fields once white with cotton were abandoned. They were allowed to grow up in brush, sedge, and wire grass.

Some of the farmers tried raising Johnson grass as a hay crop. For a time they were successful. Marion Junction, a Black Belt village, became one of the biggest hay-shipping points in the United States during World War I. Practically all of the baled hay coming from Marion Junction was Johnson grass. However, as industries substituted other kinds of power for horses and

the Alabama Black Belt

mules, and as farmers increased their own production of hay under the cotton acreage reduction program, the hay producers' outlets shrunk in size.

By 1930, the Black Belt looked almost hopeless. Thousands of people had moved out of the rural areas of this strip. The gloom was so thick that it made a London fog or a naval smoke screen seem transparent in contrast.

But there was a silver lining to this gloomy cloud. That was the establishment of the Black Belt Substation at Marion Junction that year. And with it the arrival of K. G. Baker, a short, solidly-built ex-Texas cowhand, as its first—and only—superinten-

dent. Dean M. J. Funchess of the Alabama Agricultural Experiment Station, had chosen wisely when he named Baker as head of this poverty-stricken new substation.

Funchess and Baker sized up the latter's job as finding the way to grow good pastures in the Black Belt and then build a livestock management program to convert grasses and clove into marketable products.

A simple job? On paper, yes. In theory, yes. But in the field, no! For something was wrong with the Black Belt soils. Chemical analysis had shown there was plenty of phosphate in the soil. But somehow pasture plants were unable to utilize this phos-

phate. They grow only in small, weak, scattered clumps. Applications of nitrate, potash, and superphosphate didn't help matters.

Baker pondered this problem. Then in 1931 he outlined a plan for research on pastures on the lime soils of the Black Belt. His original plan included fertilizer treatments for fifteen four-acre plots, each plot containing one acre of upland and three acres of bottom land. He wanted to find answers to seven problems as follows: (1) To find the best-adapted group of plants for pasture purposes; (2) to determine the economic value of each of the common fertilizer elements, namely nitrogen, phosphorous, and potash applied at certain rates; (3) to determine the seasonal distribution of gains and the carrying capacity of plots fertilized with varying amounts of phosphates; (4) to compare large amounts of phosphate ap-

Using two lime spreaders, applying phosphate to pasture in preparation for planting winter legumes.



April, 1950

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plied at three-year intervals with smaller applications made annually; (5) to determine the effect of fertilizers on the chemical composition of plants; (6) to determine the value of barnyard manure when applied to a pasture; and (7) to develop supplementary pastures, that when used with a permanent pasture, would furnish ample year-around grazing.

Baker succeeded brilliantly.

In 1932 he found out why both pasture and field crops had not responded to fertilization. He found the phosphate in the soil was tied up in a compound that made it unavailable for plant use. It's true that laboratory and greenhouse experiments at Auburn by Dr. George Searseth had proved conclusively that Black Belt soils would grow little or nothing without phosphate. He made this point before work was started by Baker. Nevertheless, K. G. Baker was the man who showed the importance of phosphate to cattlemen and farmers. He taught them that phosphate was the magic key that unlocked the secret of growing good pastures in the Black Belt.

Previously, experiments had been made with light applications of superphosphate. Baker, however, went further. He ap-

plied it lavishly, throwing on hundreds of pounds. That made a difference. When he put 1,200 pounds of superphosphate per acre (for a three-year period) or 400 pounds once every year, grass and clovers began to grow in rank luxuriance. Best gains were made when 1,200 pounds of 16% superphosphate were applied per acre once in every three years.

During the first seven years of Baker's experiments (1931-38) the plot receiving 900 pounds of superphosphate yielded an average of 50 pounds of beef more per acre per year than did the

400-pound plot. During the last four years of the test (1939-42) the 400-pound plot yielded the heavier fertilized plot by 83 pounds of beef per acre per year. After seven years, white clover on the plot receiving 800 pounds of superphosphate began to show the characteristic symptoms of potash deficiency. This fact led to the conclusion that continuous heavy applications of phosphate on Black Belt soils developed a potash deficiency.

Baker's experiments showed that by applying 800 pounds of superphosphate, 250 pounds of nitrate of soda, and 100 pounds of muriate of potash, beef yields per acre were stepped up. Average annual yields of beef was increased 15 pounds in 1933-36 experiments and 30 pounds in 1937-42 experiments as a result of adding the 100 pounds of muriate of potash.

Results of his other experiments on Black Belt soils can be summarized as possible:

1. Black medic, white clover and Dallis grass are the best plants for permanent pastures on the alkaline soils of the Black Belt.

2. At present prices of commercial nitrogen, its application to permanent pastures has not been profitable. The stimulation



K. G. Baker, left and Dairyman Caley study a specimen of the Caley peas, named after Mr. Caley.

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of clovers by the application of mineral fertilizers provides increased grazing in the spring, and also leaves sufficient nitrogen in the soil to stimulate the succeeding grass crop.

3. The application of manure alone to permanent pastures produces small increases in the yield of beef, but a combination of superphosphate and manure very materially increased the yield of beef.

4. There is an evident direct relation between the amount of protein produced per acre and the beef yield per acre.

5. During the grazing season on permanent pastures, there are seasonal peaks of gain and carrying capacity, with corresponding periods of low gains and low-carrying capacity.

6. It is essential to provide supplementary grazing crops to fill out the periods of low grazing on permanent pastures in order to realize the greatest returns from fertilization of pastures.

7. Black medic and Johnson grass, grown in rotation, are the best plants for supplementary pastures for this territory.

8. In a more intensive operation, such as dairy farming, small grains may be used in rotation with Johnson grass to provide supplementary grazing.

Today, some of the South's finest pastures are to be found in the 10-county area that has been changed into almost a solid pasture. In Autauga County, near Prattville, you can see a pasture that is rated as one of the finest to be found anywhere in the United States. Out-of-state ranchmen and agronomists are amazed at the luxuriance of the pastures they see in the Black Belt.

It long had been Baker's contention that the Black Belt could be developed into a major beef and dairy producing section. His prediction has been borne out. Today you can see sleek herds of registered Jerseys, Guernseys, Angus, Hereford, and Shorthorn cattle grazing on the wonderful pastures that chemical fertilizers have made possible. Great sales of feeder calves and registered breeding stock have lined the pockets of former cotton planters. Milk plants and cooling stations are replacing cotton gins.

And fertilizer dealers, who once bemoaned the loss of a good market when cotton went out, are rejoicing over the discovery that has promoted sales of their product to even greater numbers.

Visit K. G. Baker and you'll find him a quiet, publicity-shunning scientist who has revolutionized the Black Belt's agricultural outlook. No monuments have been erected in his honor. But in the green fields and the fine cattle of the Black Belt, he has a lasting monument that will always remind Black Belt people of his great contribution to their welfare.

PASTURE

(Continued from page 60)
Surpluses spell a need for restricted cultivation of cash crops so it is economical to employ all acreage possible in green pastures.

Mr. Lebo, who secured franchise for distribution of natural phosphate from the Lebo, Wyoming, mine, manufactures fertilizers, insecticides, fish meal,

vitamin oil for feed purposes and related items under the trade names of Pep and Marine products. In addition to the Portland and Seattle plants, he has units in Alaska, several tugs, and a \$200,000 herring reduction ship. A year ago he introduced "Nitrogenic," a fertilizer made from sewage and sludge, and he has produced a B-12 animal growth factor, present in fish.

His theory is: one does not have to sell fertilizer. It sells itself once a need for soil rehabilitation is recognized. Sales response and letter follow-ups on illustrated lectures are demonstrating his point. Customers are interested in green pastures.

PACIFIC NORTHWEST

(Continued from page 57)

and phosphoric acid are combined to produce ammonium phosphate. In the ammonia plant some ammonia is burned over a catalyst for the production of nitric acid. The acid is, in turn, added to more ammonia, dried and 'prilled' to form ammonium nitrate. Production from the Warfield plant is considerably over a thousand tons/day broken down as follows: ammonium phosphate 16-20-0, 300 tons/day; ammonium phosphate 11-48-0, 250 tons/day; ammonium sulphate, 450 tons/day; ammonium nitrate, 500 tons/day (includes that from Cominco's Calgary, Alberta, plant.) Cominco is reported to supply approximately 90% of all the primary fertilizer chemicals used in this area.

Mixed fertilizer represented 68.4 percent of the total sales volume for the United States for the year end-

ing June 30, 1948. The Pacific Northwest did not follow the national pattern. Of the 227,864 tons consumed, 67,558 tons were commercial mixtures and 160,266 tons were used as simples. Over thirty mixing plants in three states of Oregon, Idaho and Washington were reported as being in production or readying for production in 1948.

Consumption

For the year ending June 30, 1948, fertilizer consumption in the Pacific Northwest is reported as follows: Idaho, 58,710 tons; Washington, 82,577 tons; Oregon, 86,577 tons; total, 227,864 tons.

For the calendar year 1948, the following is reported: Idaho, 65,106 tons; Washington, 100,141 tons; Oregon, 86,695 tons; total, 251,942 tons. Of this amount, 417 tons (less than 2%) were distributed by government agencies—T. V. A. and the A.C.P. Soil Conservation Program.

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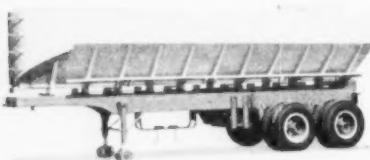
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PERCENT

500
450
400
350
300
250
200
150
100

GRAPH SHOWS YEARLY % INCREASE OF 60%
MURIATE SINCE 1939 FOR P.C.A. ALONE,
FOR INDUSTRY INCLUDING P.C.A., AND
FOR INDUSTRY WITHOUT P.C.A.

1939
P.C.A.
INDIVIDUALLY

+325%
INDUSTRY
WITH P.C.A.

+200%
INDUSTRY
WITHOUT P.C.A.

1939 1940 1941 1942 1943 1944 1945 1946 1947 1948

1948 was a record year for domestic Potash. Using '39 as a base, the industry — *not* including P.C.A. — showed an increase of 239% in '48. Muriate P.C.A. production lifts the industry increase to 325%. *P.C.A. alone shows a High Grade Muriate increase for the same period of 480%.*

95% of all P.C.A.'s '48 deliveries were in the form of 60% Muriate. Our new \$1,000,000 production and refining facilities now are operating. Our deliveries for '49/50 will break all previous records. In fact, P.C.A.'s production capacity for 60% Muriate this year will exceed by some 150,000 tons the entire potash consumption — all grades — of the nation ten years ago.

These figures are graphic evidence of the leadership P.C.A. has won . . . leadership in volume, in economy to you and to agriculture.

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